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Contents

News of the Industry 63
Business in Brief 68
Tools of Tomorrow 71
Automotive Abstracts 72
Calendar of Coming Events 73
How a Federal Judge's Action Threw Finance Case Into a Stymie. *By L. E. Meyer, L. W. Moffett and Leslie Peat* 74
The Chilton Round Table 78
Die Casting Sets a New Pace. *By Herbert Chase* 78
New Developments in Automotive Materials 85
Just Among Ourselves 86
The S. A. E. Annual Meeting 87
Advertisers' Index 47

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Philadelphia—Chestnut & 56th Sts., Phone Sherwood 1424
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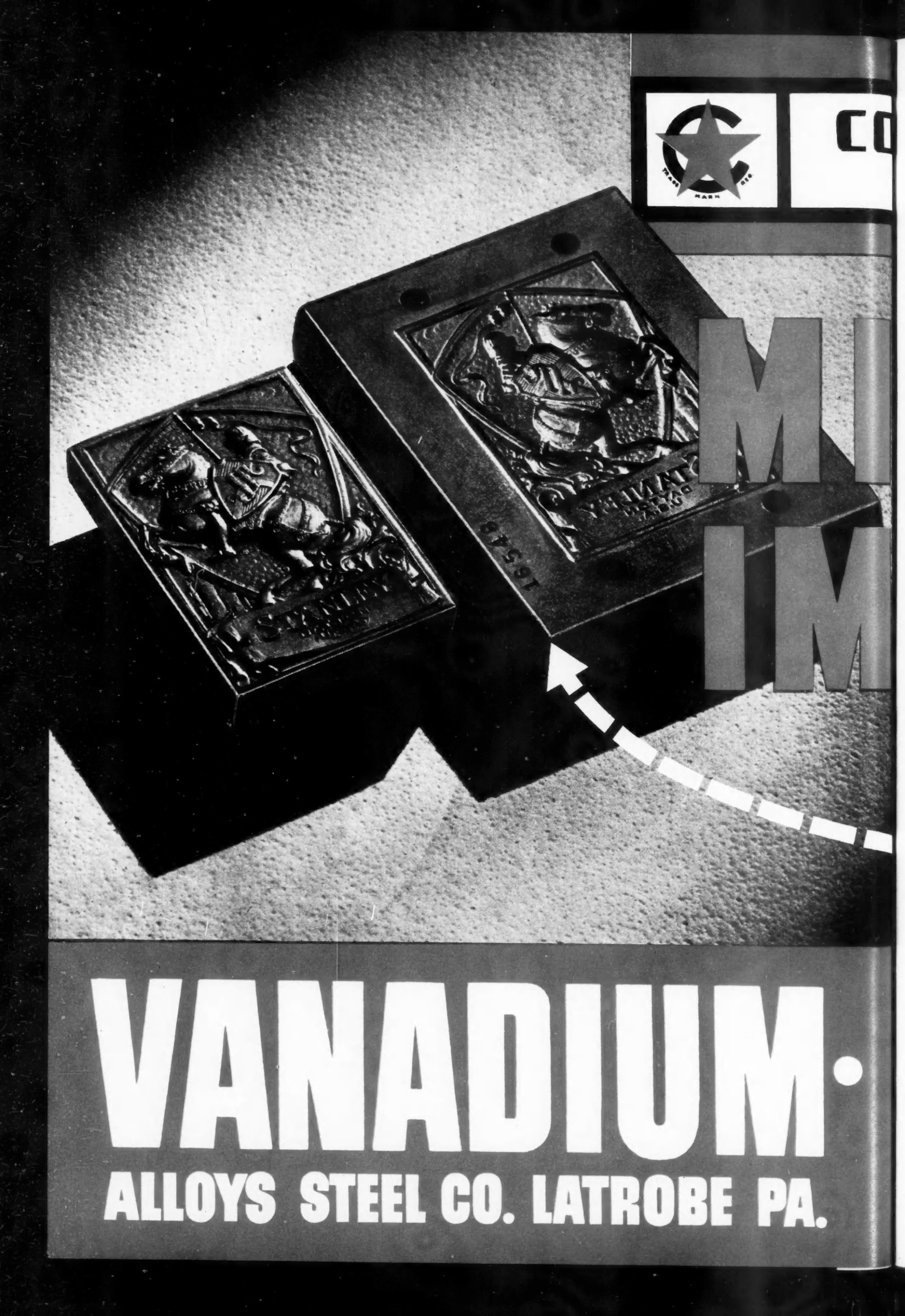
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AUTOMOTIVE INDUSTRIES

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Car Output Rate Gains

Reversal in Trend Indicated by Second Week's Production

Holiday season expressions by business leaders to the effect that the business recession was scraping bottom at that time appear to be borne out by the experience of the automobile industry whose second week in 1938 shows an encouraging gain in production over the first week.

While far from dramatic the gain represents a reversal in the trend and is constructive, furthermore, when it is considered that the industry as a whole continues to gear production directly to sales. Preliminary estimates place the week's output around 57,800 units.

Resumption of their pre-holiday schedules by the Chrysler divisions, after operation with skeleton forces for the past three weeks, accounts largely for this week's increase although Hudson's increased activity to satisfy its dealers' demands for the new Hudson 112 also has helped to brighten the picture. Chrysler divisions this week called back 40,000 workers who had been laid off prior to the holidays to bring its total force back to 55,000 working on a 24-hour or 32-hour week depending on business conditions.

General Motors units, in most instances, were sticking to the 24-hour weekly schedule announced at the first of the year by W. S. Knudsen, president. Ford is reported to be maintaining a five-day week with a daily schedule in the neighborhood of 4000 units. Total Ford and General Motors production will be about the same for the week, about 22,000 units each.

At the present time dealers have about 400,000 new cars on hand, the highest stock since 1930, according to Alfred Reeves, vice-president and general manager of the Automobile Manufacturers Association, in a statement presented to the Senate Committee investigating unemploy-

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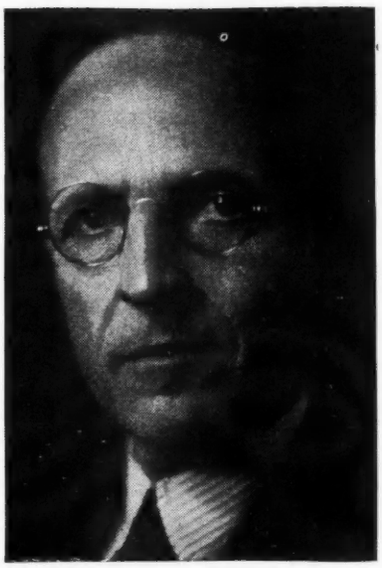


LISLE RHODES BEARDSLEE

. . . who was recently elected secretary of General Motors Corp., succeeding the late Thomas S. Merrill. Mr. Beardslee has been with the corporation since 1920, filling successively the positions of assistant to J. A. Haskell, vice-president; secretary of the executive committee; secretary of the finance committee; secretary of the policy committee; secretary of the administration committee; and assistant secretary of the corporation.

UAW Board Meets

Seeks to Clarify Union Policy on GM and Chrysler Contracts

Eyes of organized labor in the automotive industry turned toward Detroit this week where the quarterly meeting of the international board of the UAW opened Wednesday in UAW headquarters. It was reported that John L. Lewis, head of CIO, had originally requested that the meeting be held in Washington to permit him to sit in on the proceedings but final decision was to hold the meeting in Detroit.

Major problem confronted by the board was the determination of policy relative to the union's contracts with General Motors and Chrysler which expire in February and March. It was expected that at least tentative decisions would have to be made as to the attitude that would be taken toward changes in the present contracts which might be demanded by the manufacturers; as well as sim-

(Turn to page 66, please)

SAE Detroit Annual Attracts 1100

Motor Vehicle Administrators of U. S. and Canada Discuss Automobile Design Factors Related to Road Safety

Air conditioning, acoustical research, performance requirements for trucks, future legal regulations related to passenger cars, cylinder wear, fuels, and Diesel engines were subjects of paramount popular appeal at the annual meeting in Detroit of the Society of Automotive Engineers. The first two subjects were transferred from a conversational stage to definite automotive engineering functions for most of the more than 1100 members and guests who registered for the meetings.

Distinguished by vivid and "popularized" presentations of technical subjects individual sessions drew a high average of attendance and broke down traditional divisions of interest as between the various professional activity groups of the society.

Motor vehicle administrators of the United States and Canada joined in presenting through Charles A. Hartnett, New York's commissioner, a symposium of their views of the design factors in motor vehicles which have a bearing on highway safety.

Nearly unanimous on such questions as their disapproval of poor visibility in 1938 automobile design, approval of safety glass in all lights, and the desirability of dual windshield wipers, the administrators reflected divergencies of opinion on such important subjects as the desirability of using governors to control maximum speeds, and the question of headlight types and controls.

Acme photo

COURT SCENE The smoke-filled hearing room in Washington, D. C., as W. S. Knudsen (right at table), president of General Motors Corp., testified before the Senate Unemployment Investigating Committee. Mr. Knudsen in presenting reasons for the recent lay-off of approximately 30,000 men from the General Motors' rolls, said, "The corporation's policy is to keep the maximum number of people working consistent with the demand for its product. Sharing of the work is practiced down as far as 24 hours per week, when demand is low, and 40 hours per week is the standard work week when demand is normal." Additional details of Mr. Knudsen's testimony before the Committee appear on this page.

Knudsen Rationalizes GM Lay-Off

Testifies Before Senate Committee on Unemployment Relief; "I Believe This is Only Temporary Recession," He Says

To Washington last week went W. S. Knudsen, president of General Motors Corp., to testify before the Senate Committee on Unemployment Relief. Mr. Knudsen lead off his testimony with a formal statement, then answered questions posed by Senator James F. Byrnes, chairman of the committee. After testifying for nearly two hours GM's president, in company with John D. Biggers, director of the unemployment census, journeyed to the White House for a conference with President Roosevelt.

In reply to Senator Byrnes' query why the corporation had not utilized some of its surplus to retain the 30,000 employes recently laid off, Knudsen stated that the surplus would not sustain the burden for an extended period. The Senator pressed the question further, suggesting that rehiring of 30,000 men by GM would tend to restore confidence.

"It would help," admitted Mr. Knudsen. "However, that would not be business. Constant employment cannot be assured unless there is work. If the men were re-employed now, there would be no work for them to do.

"It is better to curtail than to work off inventories through reduced prices. Naturally, I don't like to lay off men. We don't make any money laying people off."

As explained in Mr. Knudsen's formal statement, inventory of materials at GM plants in 1937 soared to an all-time high, being $290,000,000, which amounted to $65,000,000 over the same time in 1936. This was due, Mr. Knudsen said, "to an accumulation of parts and sub-assemblies on account of progressive sharp curtailment of production schedules and generally higher costs of material and labor."

In speaking of sharp increases in costs in 1937, the formal statement pointed out that "Labor rates are 25 per cent higher than in 1936, and material costs rose sharply during the first half of 1937. The over-all increase in car costs amounted to 13½ per cent in 1937."

Summarizing the situation which necessitated the reduction in GM's employe rolls, Mr. Knudsen said, ". . . sales in 1937 were excellent both on new and used cars, and despite the handicap of the strikes were at a point where it looked as if 1936 figures would be reached or bettered. Consequently, the factory schedules were set to equal the last quarter of 1936 and employment arranged accordingly on a 40-hr. week basis. October and November retail deliveries in the United States were 225,109 new General Motors cars against 199,630 in 1936 and 379,657 used cars against 357,124 in 1936. During the last 10-day period in November, however, a severe drop in sales of both new and used cars took place. In fact, the total dropped to 70 per cent of 1936. We still hoped that this would be the low point and expected to keep the men working, on shortened hours, but when the second period in December showed a drop to 45 per cent of 1936, it became necessary to adjust the working force, which was done by retain-

Acme photo

SENATOR James F. Byrnes (left), chairman of the Senate Unemployment Investigating Committee, and W. S. Knudsen, president of General Motors Corp., pictured at the recent hearing in Washington, D. C.

ing all the men we could take care of on a 24-hr. basis, and laying off the balance.

"The drop in sales in so short a period is the most severe experienced in the history of General Motors. It was wholly unexpected and entirely beyond our control."

Plan Foreign Plants

Addition of European Assembly Units by Willys

Plans for European assembly plants were revealed by Ralph J. Archer, vice-president and manager of the Willys Export Corp. on his recent return from a business trip abroad.

The new assembly plans are designed to reduce the cost of delivering Willys cars and trucks in European countries.

Mr. Archer did not state specifically in which European countries the assembly operations will be established. In former years, Willys-Overland confined its assembly operations to England. Under the new plan there will be operations in all European countries where an appreciable volume of Willys sales are being made.

1937 Rim Inspections Show Gain

Total number of rims inspected and approved by the Tire and Rim Association in 1937 numbered 22,257,964; 1936 inspections numbered 20.790,192.

Statistics for December, 1937, showed 1,121,018 inspected and approved as compared to 1,941,550 for December, 1936. A decrease of approximately 42 per cent.

Acme photo

THE FORD R.R. Henry Ford's first and only venture in the railroad business was brought back into the limelight last week when Edsel Ford gave testimony before the Senate Rail Inquiry Committee hearing in Washington, D. C., on the details of the sale in 1929 of the Detroit, Toledo and Ironton Railroad. Mr. Ford owned this road at that time and passed it over to the Pennroad Corp. for approximately $35,500,000. Pictured above are Senator Burton K. Wheeler (left), chairman of the Senate Rail Inquiry Committee, and Edsel Ford.

Edsel Ford Queried on Railroad Deal

Details of Detroit, Toledo & Ironton Road Transaction Revealed at Senate Committee Investigation

Edsel Ford, president of the Ford Motor Co., testified last week before the Senate Committee on Interstate Commerce investigating the $141,000,000 Pennroad Corp. The committee was interested in learning what Mr. Ford knew about the sale of the Detroit, Toledo & Ironton Railroad to Pennroad in 1929. The Fords, who owned the road at that time, sold it for $35,499,312 to Pennroad. According to A. H. Harris, vice-president of the New York Central, this figure represented about three times the actual value of the road.

"Why was it that you decided to sell the Detroit, Toledo & Ironton?" Senator Wheeler, chairman of the Senate Committee, queried Edsel Ford.

"For various reasons," answered Mr. Ford. "Times were changing and we found that due to restrictions imposed upon us by the Interstate Commerce Commission, we were unable to do many things we wanted to do in order to increase the efficiency of the road, such things as better and lighter cars made of steel, and other innovations which we were convinced would work to the betterment of the road."

From the outset of negotiations involved in the transaction, Henry Ford refused to make any agreement which could require the Ford Motor Co. to route traffic over the D.T.&I. after the ownership was transferred.

"On this point my father was adamant," said Edsel Ford.

The final contract of sale contained no stipulation obligating the Ford company to grant any preferential traffic business to the Pennroad.

"I knew Henry Ford," said A. J. County, vice-president of the Pennsylvania Railroad, "and I knew he would not take $35,000,000 of our money and then gut our business the next day."

(Turn to page 71, please)

Approve Minton Resolution

Senate Group Sanctions $50,000 Expenditure By FTC For Automobile Manufacturer-Dealer Probe

The Minton resolution calling for an expenditure of $50,000 by the Federal Trade Commission in investigating manufacturer-dealer relations in the automobile industry has been approved by the Senate Interstate Commerce Committee.

If finally approved by the Senate, the FTC will be authorized to determine if present manufacturer-dealer contracts are "fair and equitable," if dealers can earn a reasonable profit, and if manufacturers "employ coercion to the detriment of the dealer, the consumer and the public."

Both General Motors and Chrysler have written to the House subcommittee, which was named to consider a similar resolution sponsored by Representative Withrow, who recently asked spokesmen for the two companies to submit figures on "dealer mortality."

R. H. Grant, vice-president of General Motors Corp., advised Chairman Crosser of the sub-committee that no specific information on the subject is available although he submitted an analysis of "dealer changes" resulting from a variety of causes ranging from retirement and business failure to cancellation of contracts by the manufacturer.

(Turn to page 69, please)

MEN OF THE INDUSTRY

ABBOTT F. RIEHLE has been appointed sales manager of the Smootharc welder and welding electrode division of Harnischfeger Corp., Milwaukee. He was recently in charge of sales for American Machine & Metals, Inc.

ROBERT L. HAMILTON, formerly sales promotion manager of the Dumore Co., Racine, Wis., has been advanced to general sales manager. He succeds **LELAND B. AUGUSTINE,** who is now in charge of the Chicago sales territory.

ARTHUR J. SEEGER has been elected president of the Stanek Tool & Mfg. Co., Milwaukee, succeeding the late **EDWARD J. STANEK.** He is one of the founders of the firm and has been treasurer and general superintendent.

S. C. BRAY, for more than two years sales promotion manager of Pontiac Motors, has left that position to become the Pontiac dealer for Tampa, Florida.

UAW Board Meets

(Continued from page 63)

ilar action on changes originating within the locals operating in General motors and Chrysler plants.

Action also is expected on the union's financial problems. Homer Martin, UAW president, testified in Washington last week before the Senate Committee on Unemployment and Relief that 100,000 UAW workers were out of work at that time. Resultant decrease in the union's income, with laid-off workers not paying dues, and with others on shortened hours delinquent, has necessitated the laying-off of organizers. Decisions will have to be made as to whether seniority will be followed strictly when organizers and office workers are let out.

More than 100 women delegates, representing local auxiliaries in a dozen cities, attended a two-day session or auxiliary conference in Detroit this week. Among resolutions passed were: Recommendation to the UAW international executive board for the formation of a fact-finding and advisory commission to fight high living costs, the commission to be composed of UAW members, experts on housing, renters' and consumers' representatives, and President Martin; request that the State Legislature declare a debt moratorium for unemployed workers and abolish the State sales tax, substituting a graded income tax; and several others all having a bearing on relief and the cost of living. Greetings and good wishes for a successful meeting were wired to the conference by Mrs. Roosevelt.

SAE Detroit Papers

Abstracts of technical papers of automotive interest presented at the annual meeting of the Society of Automotive Engineers, held Jan. 10-14, in Detroit, appear in this issue of AUTOMOTIVE INDUSTRIES, starting on page 87. Others will be published in subsequent issues.

Employment Control

Continuous Employment Efforts Described in GM Pamphlet

In a statement entitled "The Worker in General Motors" sent to General Motors stockholders, Alfred P. Sloan, Jr., chairman of the board of General Motors Corp., observed that outstanding progress has been made by his organization and the industry in regularizing employment.

"Over two years ago," said Mr. Sloan, "General Motors set up a revolving fund of $60,000,000 for the purpose of building up inventory in periods of low seasonal consumer demand. In addition to this, the yearly models are now introduced earlier in the belief this will provide additional work during winter months when outside work is unavailable."

He stated further that car prices per pound had been persistently lowered to a level, in 1937, which was 45 per cent below 1925; while at the same time hourly wage payments increased to a level 18 per cent above 1925. Mr. Sloan reported that the average number of workers employed in General Motors plants for the first 10 months of 1937 was 194,013 which was more than 100,000 above the low point of 87,843 in 1932.

Aluminum Output

Ingot Production Held Steady Despite Drop in Orders

The Aluminum Co. of America is maintaining a steady program of aluminum ingot production in the face of a falling off of orders in the past three months of more than 60 per cent, according to Roy A. Hunt, president of that company.

"Frank statements of policy by industry can have a most beneficial effect on the welfare of the country and much good can result if American industry and Government will today make known their intentions in the fight against the present recession," said Mr. Hunt.

The Aluminum company's president stated further that the $26,000,000 expansion program, announced last April, will also be continued in spite of the present recession.

Roos to Willys

Delmar G. Roos Appointed Vice-President and Chief Engineer

Delmar G. Roos, former president of the Society of Automotive Engineers, was this week announced as new vice-president and chief engineer of Willys-Overland Motors, Inc., by Ward M. Canaday, chairman of the board.

For the last year he has been consulting engineer for Humber, Ltd., at Coventry, England, and has made a comprehensive study of low-priced economy type of motor cars in Europe. He is a graduate of Cornell University as mechanical and electrical engineer. Mr. Roos began his automotive engineering with Locomobile and has been chief engineer of Marmon and Pierce-Arrow.

Car Output Rate Gains

(Continued from page 63)

ment and relief. Manufacturers, in turn, have on hand large inventories of parts and sub-assemblies.

Used car sales are beginning to show the effects of concerted efforts by dealers and manufacturers and while still not being shouted about also present a more constructive tone to the entire automotive sales picture.

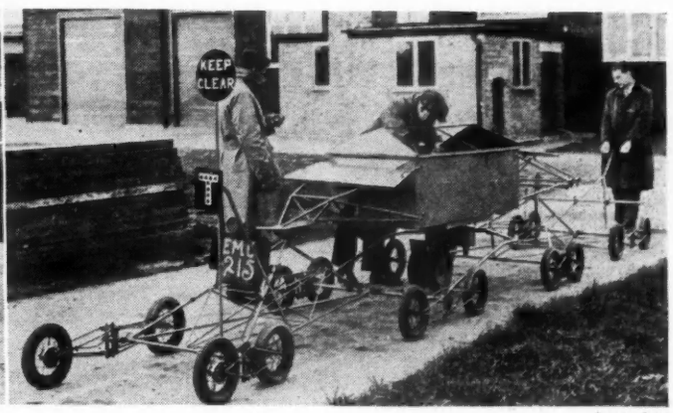
Release by the Automobile Manufacturers Association of its December estimate of new car shipments and disclosure of the fact that the industry did after all pass the five-million mark in 1937 have added to the encouragement. According to the AMA figures the industry produced 5,002,188 units during 1937 and thereby achieved its second five-million-car-year in history.—J. A. L.

. . . slants

TABOOS REMOVED—*The Australian Minister of Trade and Customs has announced removal of import license restrictions on certain products, including motor vehicle bodies. A report to this effect has been received by the United States Department of Commerce from the Australian customs representatives in New York.*

Other products included in the

SAFETY STATISTICS In a modern laboratory in Harmondsworth, Middlesex, near London, England, the British Ministry of Transport is conducting scientific tests in an effort to improve safety of public highways. The 12-ton truck chassis pictured above is part of the laboratory equipment. It is attached by a heavy girder to a center turntable and travels over a circular course made up of different road surfaces.



Acme photo

BUMP RECORDER Part of the equipment at the Transport Ministry's laboratory in England is this 19-wheeled machine, incorporating a revolving drum in the top center, which is used to detect irregularities in road surfaces. It is rolled over different types of roadbeds and records every irregularity on a graph on the drum. The machine is shown in action with an engineer checking the graph.

new list, in addition to motor vehicle bodies, are spark plugs, piston pins and rings and valves for internal combustion engines.

TREE TRAILERS—*The first two of five special trailers to be used in moving 4000 trees to the site of the 1939 exposition at San Francisco have been delivered by the Trailer Co. of America.*

Each drop-frame trailer, designed for a load of 20 tons, is 25 ft. long and 8 ft. wide, with bed only 34 in. above the ground. A tandem trunnion-type rear end, full oscillating, allows the trailer to take a 10-in. curb with the load distributed on the two 4½-in. axles, which are seamless steel tubing, heat treated. Brakes are vacuum operated.

BEWARE—*A number of American firms report that they are being defrauded by bogus agents claiming to represent foreign steel companies, despite warnings issued by the National Better Business Bureau. Apparently these concerns make oral agreements with the bogus agents for sample shipments of steel for $10 to $25, then discover the "little paper" they signed clinching the agreement was an order for thousands of dollars' worth of steel.*

Monroe-Harris Cooperate

Under a contract agreement made by the Monroe Auto Equipment Co. and the Harris Products Co., the former will manufacture shackle and strut assemblies under the Harris patents.

Harris bushings and bearings are to be used in the new products, which will be known to the trade as Monroe-Harris shackles and struts.

Recession in Limbo at Boat Show

Huge Crowds Pack Grand Central Palace in New York to View Exhibition of Latest Marine Equipment

There were no signs of a "recession" in the motor boat business at the annual national motor boat show which opened at the Grand Central Palace, New York, on Friday evening, Jan. 7. Three floors of the Palace were packed more than in any previous year with boats, engines and accessories, and the attendance was excellent.

Nearly all of the larger engines exhibited were of the Diesel type, the following makes of such engines being represented: Buda, Hall-Scott, Red Wing, Atlas-Imperial, Fairbanks-Morse, Superior, Cummins, Sterling, Cooper-Bessemer, Kermath, and Speedway. Buda exhibited two new models, the 4-LDM 196 and the 6-LDM 691, the former a four-cylinder of 196-cu. in. displacement and the latter a six-cylinder of 691-cu. in. All of the new Buda engines have the Lanova combustion head.

Atlas-Imperial exhibited a variety of engines, including a heavy, low-speed six-cylinder type developing 160 hp. at 325 r.p.m. and weighing 18,200 lb. or more than 100 lb. per hp., and a spark ignition, fuel-injection engine known as the Atlasco, which has been under development for some years and has now been placed in production. The principal feature of this engine is the type of fuel injector used, which works on the electro-magnetic principle. The Atlasco engine shown is rated at 65-90 hp. at 2200-2800 r.p.m. and weighs 1450 lb.

Fairbanks-Morse showed an extensive line of Diesel engines of both the two-stroke and four-stroke types, ranging in output from 10 hp. up. The latest development is the Model 36, a six-cylinder four-stroke engine developing 210 hp. at 720 r.p.m. which can be furnished with reduction gears with up to 3:1 ratio. It is equipped with built-in fuel-injection pumps of Bosch make, and with built-in water and oil circulation pumps. Air starting is used, the starting air being admitted to the engine cylinders. Superior Engine Division of the National Supply Co. exhibited its new six-cylinder marine Diesel of 110 hp., together with a cut-away model showing all interior working parts. The Kermath exhibit included a new small size Diesel of 60 hp. and Sterling again showed its two-stroke swashplate engine built under Michell patents, which has now gone into production.

In looking over the exhibits of gasoline-type marine engines at the show one cannot help getting the impression that things are not obsoleted as quickly in the marine as in the automobile field, for among the engines shown there are some with make-and-brake or low-tension ignition and others with T-heads. The greatest activity seems to be in outboard engines, of which six makes were represented: Clarke, Bendix, Johnson, Neptune, Evinrude and Elto.

Bendix has added two models, a single-cylinder DeLuxe model and a

(Turn to page 73, please)

Business in Brief

Written by the Guaranty Trust Co., New York

General business activity continued the downward trend last week, and the outlook appears more uncertain. The business index compiled by the *Journal of Commerce* stood at 61.1, the lowest since September, 1934, as compared with 65.7 for the preceding week and 92.2 for a year ago. The current decline was largely the result of a further curtailment in automobile production and the failure of car loadings to register the usual seasonal rise after the holidays. The anticipated downward trend in retail sales did not materialize; and, under the stimulus of widespread mark-down sales, trade was from 2 to 8 per cent above that in the preceding week. Agricultural interests were benefited by abnormally warm weather in most sections of the country last week, and livestock in the West was favored.

Freight Loadings

Railway freight loadings during the week ended Jan. 1 totaled 457,359 cars, which marks a decline of 3008 cars below those in the preceding week, a decrease of 130,904 cars below those a year ago, and a drop of 15.5 per cent below those two years ago.

Production of electricity by the electric light and power industry in the United States during the week ended Jan. 1 was 3.3 per cent below that in the corresponding period in the preceding year.

Production of lumber during the week ended Dec. 25 stood at 34 per cent of the 1929 weekly average. For the third consecutive week new orders were above the level of production. Both shipments and new orders were below those in the preceding week and in the corresponding week in 1936.

Employment

According to an estimate by the Bureau of Labor Statistics, 570,000 fewer workers were employed in November than in October in manufacturing and non-manufacturing industries. Weekly payrolls were $25,900,000 smaller.

Professor Fisher's index of wholesale commodity prices during the week ended Jan. 8 stood at 83.2, as compared with 83.1 the week before and 83.2 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended Jan. 5 showed a decline in both discounted bills and bills bought in the open market of $2,000,000. Holdings of Government securities remained unchanged. Money in circulation declined $61,000,000, and the monetary gold stock was $5,000,000 lower.

GISUKE AIKAWA

. . . head of Japan's Nissan interests, who is preparing for a trip to the United States in connection with the establishment of the 3,000,000,000 yen heavy industry company in Manchukuo, of which Mr. Aikawa is to be president. Mr. Aikawa will seek financial and technical assistance for his project, part of which is a 1,000,000,000 yen automotive concern.

Auburn Wins Skirmish

Federal Court Orders Company To Retain Its Properties

The Auburn Automobile Co., undergoing reorganization under section 77-B of the amended bankruptcy act, won its first skirmish in the Federal Court at Fort Wayne, Ind. Last week it was ordered to retain possession of its properties instead of appointing a trustee.

The order, entered by Federal Judge Thomas W. Slick, eliminated at least temporarily, the naming of trustee which would, according to Raymond C. Pruitt general counsel for the Cord Corp., prove extremely expensive. Attorneys representing 512 of the 3300 stockholders also approved the order.

Auburn ceased its automobile manufacturing activities last August, and has turned to metal stamping products, and automobile parts and accessories. Roy F. Faulkner, president of Auburn and the Lycoming Manufacturing Co., another Cord subsidiary, said the latter concern is also seeking to reorganize.

A.S.T.E. Sponsors Show

Machine and Tool Progress Exhibit Scheduled for Detroit, March 9

A Machine and Tool Progress Show, national in character, is scheduled to open at Convention Hall, Detroit, on March ninth. The show is being sponsored by the American Society of Tool Engineers and will be held in conjuction with its first annual convention.

The national convention will be under the direction of the executive committee, composed of Frank A. Shuler, master mechanic, Chrysler Corp. and president of the A.S.T.E.; Luke E. Beach, assistant master mechanic of Packard; Walter F. Wagner, Lincoln, master mechanic; C. R. Brunner, tool engineer, Dodge Brothers; Frank R. Crone of Lincoln; and Ford R. Lamb, executive secretary of the A.S.T.E.

James R. Weaver, chairman of the Pittsburgh Section and Director of Equipment, Westinghouse Electric and Mfg. Co., is in charge of the program, with J. A. Siegel, Packard Motor Car Co., in charge of entertainment, and Mr. Lamb as chairman of the committee in charge of the exhibits.

Buick Shows 24 Per Cent Gain

A sharp upturn in the last ten days of December brought total retail deliveries of Buick cars in the United States to 204,765 units in 1937, as against 164,661 in 1936, a gain of 24.3 per cent.

According to W. F. Hufstader, general sales manager, Buick dealers delivered 5708 cars during the last ten days of December. This compared with 4685 in the previous 10-day period and with 4633 in the first ten days of the month.

Hudson 112 Uses Celoron Gear

The recently announced Hudson 112 car will employ a Celoron "spoke" gear in its engine timing mechanism.

According to the Continental-Dia-

mond Fibre Co., the Celoron gear is the first fundamental change in timing gear design since the introduction over 20 years ago of the die-formed, solid molded type of silent timing gear.

Minton Resolution

(Continued from page 65)

The figures showed that "dealer changes" among GM dealers averaged 12.8 per cent a year during the last 10 years and 11 per cent during the past five years. The letter pointed out that since the data on total combined "dealer changes" cover all reasons, including "dealer mortality," it is obvious that a figure of "dealer mortality" alone would be much less than the figure covering "dealer changes" for all reasons.

B. E. Hutchinson, chairman of Chrysler Corp.'s Finance Committee, also wrote the sub-committee that the information asked for is scarce but he disclosed the results of a questionnaire circulated among Chrysler dealers in Wisconsin, Withrow's own State. The data indicated that out of 433 dealers in the State, 65 per cent have been selling new cars for more than five years; 51 per cent have been selling new cars for more than 10 years; 27 per cent for more than 15 years, and 18 per cent for more than 20 years. The average experience of Wisconsin Chrysler dealers in selling cars—Chrysler products and others—is approximately 11 years, according to the letter.

Hutchinson warned the sub-committee that when a dealer changes from one line of cars to another, that it should not consider that the dealer is "going out of business."

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

Minor Mention

The Winton Motor Carriage Co. have issued a challenge to any American or European manufacturer of motor carriages to race them from Chicago to New York, or over any other route of not less than 1000 miles, in the United States. The terms require that competitors shall use regular single seated commercial machines, carrying a driver and one passenger.

From *The Horseless Age*, April, 1898.

Automobiles on New Tariff List

United States May Grant Concessions to United Kingdom In Proposed Reciprocal Trade Pact

Automobiles, trucks and tractors are included in the extensive list of products on which the United States will consider granting concessions in tariff rates in connection with the proposed reciprocal trade agreement with the United Kingdom.

The automotive list includes: Automobile trucks valued at $1,000 or more, automobile truck and motor bus chassis valued at $750 or more and motor buses and their bodies, all dutiable at 25 per cent; all other automobiles, automobile chassis and automobile bodies and motorcycles, dutiable at 10 per cent; parts (except tires and except parts wholly or in chief value of glass), dutiable at 25 per cent; internal combustion engines and tractors (except agricultural implements), dutiable at 27½ per cent.

Negotiations will begin early in February upon arrival in Washington of experts from the Board of Trade and other British Government departments. The British delegation will be headed by Sir Ronald Lindsay, Ambassador.

The United Kingdom will act in the negotiations for Newfoundland and the British Colonial Empire.

The Committee for Reciprocity Information has asked that those who are interested in the negotiations to file their views, by brief or in person, with it not later than noon Feb. 19. Public hearings will begin March 14. Briefs and requests should be addressed as follows: Chairman, Committee for Reciprocity Information, Old Land Office Building, 8th and E Streets, N. W., Washington, D. C.

Secretary Hull pointed out that representations which interested persons may wish to make to the committee need not be confined to the articles appearing in the list but may cover any article or articles of actual or potential interest in the import or export trade of the United States with the United Kingdom, Newfoundland or any part of the British Colonial Empire. However, it was stated, only the articles contained in the list already issued or in any supplementary list issued later will come under consideration for the possible granting of concessions by the United States.

Sloan Contributes $25,000

The National Safety Council has announced a $25,000 contribution to traffic safety by Alfred P, Sloan, Jr., chairman of the board of General Motors Corp.

Nov. New Car Dollar Volume Tops Oct. by 4.3%

Estimated dollar volume of new passenger car registrations for November recovered with an upward movement of 4.3 per cent over the October figure to aggregate $170,800,000.

In the table below it should be noted by the reader that, due to increase in delivered prices of the 1938 models, it has been necessary to abandon the classification of "Others under $750" and place all the low-priced cars in the price classification of "Under $1,000."

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes*

	New Registrations†				Estimated Dollar Volume†			
	November		First 11 Months					
	Units	Per Cent of Total	Units	Per Cent of Total	November	Per Cent of Total	First Eleven Months	Per Cent of Total
Chevrolet, Ford and Plymouth	98,291	51.71	1,875,176	57.42	$74,400,000	43.57	$1,308,100,000	50.04
Others under $1000	58,199	30.62	1,174,557	35.96	55,500,000	32.49	1,019,100,000	38.98
$1000-$1500	31,261	16.45	189,512	5.80	35,600,000	20.84	225,500,000	8.63
$1500-$2000	1,135	.60	13,153	.40	1,900,000	1.11	22,300,000	.85
$2000-$3000	1,031	.54	11,313	.35	2,700,000	1.58	29,600,000	1.13
$3000 and over	151	.08	2,302	.07	700,000	.41	9,600,000	.37
Total	190,068	100.00	3,266,013	100.00	$170,800,000	100.00	$2,614,200,000	100.00
Miscellaneous	117		1,306					
Total	190,185		3,267,319					

* All calculations are based on delivered price at factory of the five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes.
† Does not include data for returns from Wisconsin since June.

Automotive Metal Markets

Copper Assumes Lead in Price Upturn for Non-Ferrous Metals; Mild Improvement in Demand for Steel Continues

Copper took the lead this week in an upward readjustment of prices for non-ferrous metals that, under lack of buying interest in the closing days of last year, had receded to a point where they were out of line with the general commodity price index. It wasn't so much the actual advance that came in for attention, as the manner in which it came about, successive advances of one-eighth of a cent per pound being announced by the leading custom smelter as sales from day to day indicated a better balance of intake and demand.

London advices reported speculative interests to have returned to the market, this together with Russian buying resulting in higher prices abroad, but the market here was more influenced by improved consuming demand at home, some consumers, for the first time in months, taking heed of the morrow and covering in a conservative way their early second quarter needs. Mine producers had adhered right along to their quotation of 11 cents, but since the leading custom smelter booked business up to the middle of last week at 10⅛ cents, their sales were restricted to their affiliates and subsidiaries. At the beginning of this week custom smelters had lifted the price to 10⅝ cents and at the opening of the market on Wednesday it stood at 10⅞ cents, only ⅛ of a cent below mine producers' quotation.

Tin benefited from the better tone in copper, but advances in London and Singapore were offset to some extent by the feeling that American consumers are fully covered for their first quarter's needs. Following a few sales at 42 cents, the asking price for spot Straits rose to 42⅛ cents, and on Tuesday 42⅞ cents was chalked up.

Lead prices moved into higher ground, the 4¾ cents (New York) price, which had been in effect since the middle of December, giving way early this week to 4.85 cents, with leading marketers more than usually cautious so as to keep things on an even keel. The United States Treasury Department bought a moderate tonnage at 4.90 cents, $1 per ton more than the market because of out-of-the-ordinary delivery terms. On Tuesday, the price was advanced another $1 a ton.

A rather unfavorable statistical position, showing an increase in ore output and a decrease in shipments, operated against zinc sharing in the uptrend of the other metals.

Announcement that primary aluminum production is being maintained in the face of curtailed consuming demand imparted steady undertone to the market for secondary metal.

Mild improvement in the demand for steel continues. Schedules of finishing mills show moderate gains in nearly all steel-making districts. A gradual return to 30 per cent of capacity operations is looked for before the end of the month. The American Iron and Steel Institute's report of this week's rate of employed ingot capacity of 27.8 per cent denotes an improvement of 8.6 per cent over last week. Moreover, it is the best showing made since the beginning of December.

Last year's shipments of finished steel products by the leading interest, reported at 12,825,467 tons, indicate an 18 per cent rise over 1937, when shipments aggregated 10,825,162 tons. In view of the increase in last year's ingot output over the preceding year being estimated at only 6 per cent this showing comes in for much interest.

Although negotiations between the steel companies and C.I.O. unions concerning renewals of wage pacts are scheduled to get under way Feb. 7, no indication as to the steel industry's attitude has come from any responsible source. A report that there would be a joint announcement of a reduction in steel wages and also in steel prices is hardly taken seriously. The attitude of the leading steel company, when it submitted to the original demands of the unions, came as a complete surprise to the smaller producers and it is anybody's guess what will take place when this year's negotiations get under way. Meanwhile, when there is nothing else to talk about, steel prices continue to be a popular theme.—W. C. H.

Outlook in Akron Brightens

Plans of Automobile Makers to Step Up Output Schedules Will Enliven Activity of Major Tire Producers

Plans of car manufacturers to recall many thousands of their furloughed employes and to increase automobile production substantially, will be reflected in an upturn of employment and tire production in the parent and subsidiary plants of the four major tire manufacturers who supply the original equipment tire market. These four are Goodyear, Goodrich, Firestone and United States Rubber.

Goodyear Tire & Rubber Co. will benefit principally, among tire companies, by the new Hudson program as Goodyear furnishes all of Hudson original equipment tires. Goodyear also has the exclusive tire contract with Chrysler and its subsidiary lines and in addition furnishes the bulk of Nash tires. Goodyear also furnishes some Packard and Ford tires.

Firestone Tire & Rubber Co. has consistently furnished more than half of all Ford original equipment tires and 100 per cent of Studebaker tires, also supplying some Packard, Nash, Buick, Olds, Cadillac and LaSalle tires. The B. F. Goodrich Co.'s original equipment "back log" is 50 per cent of all Chevrolet tires. In addition Goodrich furnishes tires for other General Motors cars, Packard and about 20 per cent of Ford's requirements. United States Rubber Co. gets the bulk of all General Motors business and about 15 per cent of Ford's business.

Goodyear, Goodrich and Firestone retrenched production drastically toward the close of 1937, both in the parent Akron plants and in their decentralized plants as well. While no official statements are forthcoming, it is an established fact that there are virtually no original equipment tires in inventory, which would mean re-employment and heavy production increases to fill the demands of car manufacturers.

The Ford Motor Co.'s new tire plant is expected to be in operation soon. Original plans called for facilities to handle at least half of the company's tires, with Firestone retaining its share but Goodrich, Goodyear and United States probably losing the bulk of their respective shares.

In 1937 the car industry took approximately 23,000,000 original equipment tires, against earlier estimates of 24,500,000. The estimate for 1938 is 17,000,000 to 21,000,000. Insofar as is known, there has been

no change in the price structure on primary market tires since the increase of last July.

One of the first steps in the revival of the Akron tire industry will be the reinstatement of the eight-hour day, it is said upon reliable authority. It is pointed out that the Akron plants, with their old equipment, cannot hope to compete on a cost basis, as long as the six-hour day is in effect, with the new, more efficiently arranged and equipped subsidiary plants that were established last year under the Akron industry's decentralization program.

GM Sales Up 3.9%

Dealers in U. S. and Canada Take 2,116,897 Cars

Despite a falling off in December, sales of General Motors cars to dealers in the United States and Canada showed an increase of 3.9 per cent for the year 1937. December sales, together with shipments overseas, totaled 160,444 compared with 239,114 in December, 1936. Sales in November were 195,136. Sales for 1937 totaled 2,116,897 compared with 2,037,690 in 1936.

Sales of General Motors cars to consumers in the United States totaled 89,682 in December compared with 173,472 in December a year ago. Sales in November were 117,387. Sales in this classification for 1937 totaled 1,594,215 compared with 1,720,213 in 1936, a decrease of 7.3 per cent.

Sales of General Motors cars to dealers in the United States totaled 108,232 in December compared with 197,065 in December a year ago. Sales in November were 153,184. Sales to dealers in the United States for 1937 totaled 1,680,024, only slightly less than sales of 1,682,594 in 1936.

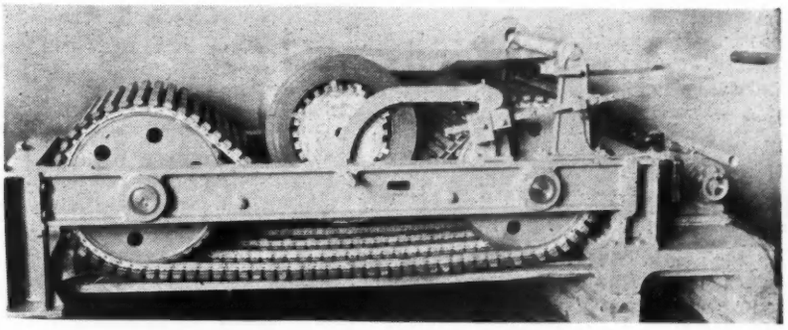
Pierre Michelin

The death of Pierre Michelin in a motoring accident near Paris has been reported from France. He was the son of Edouard Michelin, one of the two brothers who founded the Michelin Tire Co. In addition to assisting his father in the tire business, he was president of the Citroen Automobile Co.

Hupp Offers Conditioned Air

According to W. A. MacDonald, vice-president and director of sales, Hupp Motor Car Corp., conditioned air units are now available as optional equipment on all models.

TOOLS OF TOMORROW



Stock reel for unwinding metal coils

Unwinding Reel

. . . with provision for handling high finish metal coils without marring

The heavy stock reel shown in the accompanying illustration was designed to unwind coils of metal having a maximum weight of 8000 lb. and deliver the metal automatically and at the desired speed to a roll feed press. The machine, which is recommended for use with slitters and other automatic fabricating machines in addition to roll feed presses, is the product of the Waterbury Farrel Foundry and Machine Co., of Waterbury, Conn., and, according to the manufacturers, is capable of unwinding thin gage metal, as well as heavy. The particular reel shown has a capacity for 28 in. wide metal in coils up to 48 in. diameter.

A carrier, made to protect the surface of bright-finished metal against injury, consists of four sprocket driven roller chains to which maple slats, reinforced by steel, are attached to form a cradle for supporting and unwinding the coil. The carrier is 30 in. wide and is chain-driven, through a variable speed unit of commercial design, by means of a 1 hp. motor.

A guide is employed to keep the metal straight as it passes between a pair of driven rolls. These rolls deliver the stock at a speed slightly greater than the feed of the press. The metal passes under a feeder roll, which is extended from the reel proper, and thence to the press feed.

The position of the extending feeder roll arm, up or down, operates a mercury switch to start or stop the motor. Whenever there is sufficient slack to permit the arm to drop down, the motor is switched off; when this slack is taken up by the press feed the arm lifts and the motor is switched on. Thus, the reel also stops automatically when ever the press is shut down.

The manufacturers point out that the intermittent feeding tension, usually produced by the drag of a heavy unwinding coil, and the jerk caused by the taking up of occasional slack, are both eliminated by the use of this unwinding reel; furthermore, that the varying weight of the coil from beginning to end will not cause the feeding tension to vary.

Edsel Ford Queried

(Continued from page 65)

Several financing plans were suggested, but in the end all of them were thrown out because, said Mr. County, "Henry Ford wanted cash and nothing else."

Mr. County was asked if the Ford traffic was a controlling factor in the Pennsylvania's efforts to obtain control of the D.T.&I. Mr. County replied that was a very important factor. He also said the trouble in the beginning was getting the money to pay the Ford price.

"You could not get the cash and that was what led to organization of the Pennroad Corporation, isn't that the fact?" asked Senator Wheeler.

"One of the reasons, yes," Mr. County answered.

The evidence was that the D.T.&I. is still handling Ford traffic in large volume. According to the committee accountants, the D.T.&I. investment of the Fords brought them a profit of more than $9,000,000.

AUTOMOTIVE ABSTRACTS

Synthetic Motor Fuels

In a report of the Fuel Research Board for the past year, some information is given on progress made in Great Britain in the production of synthetic motor fuels. A single-stage process for the hydrogenation of tar was developed some years ago, and a semi-commercial plant capable of treating from 200 to 400 gal. per day was erected. During the past year it was shown that this plant will work satisfactorily at its rated "throughput" and that if worked at a pressure of 600 atmospheres, 600 gal. can be treated per day. The tar is subjected to the influence of a molybdenum-sulfide catalyst at from 896 to 932 deg. Fahr. under a pressure of 200 atmospheres.

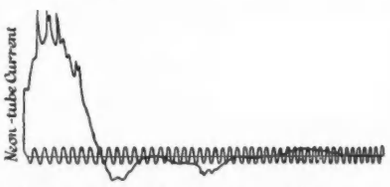
Development work is now being done on a two-stage process. The tar is first treated in the liquid phase at a temperature of 840 deg. Fahr. and 200 atmospheres pressure, in the presence of a catalyst suspended in it, molybdenum compounds and hydriotic acids having proved the most active. In this way an oil which originally yielded 12.4 per cent of a volatile liquid distilling below 392 degs. Fahr., now yields 26 per cent, its gravity being reduced from 1.014 to 0.905 in the most successful instance.

The importance of this work lies in the fact that there is less deterioration of the catalyst when using partially hydrogenated tar than with crude tar, and it is possible to use a much more active catalyst for the vapor-phase stage. It is thought that this may prove to be the germ of a method by which lubricating oils may be produced from carbonaceous materials.

Other work on the production of lubricating oils has been started by the construction of a small Fischer-Tropsch installation capable of dealing with 100-150 cu. ft. of synthesis gas per hour. Some difficulty was encountered in the production of the catalyst. This plant is designed to ultimately produce high yields of olefines, which can be converted into lubricating oils by polymerization. So far oil sufficient only for laboratory tests has been produced. The aim now is to study the technique of the process in order to elucidate the constitution of coal and to produce more diverse products from the available raw materials. Research at Cambridge into the nature of catalysts has made it possible to control the reactions with greater precision.—*Report of the Fuels Research Board* for the year ended March 31, 1937—H. M. Stationery Office, London.

Neon Tubes in Stroboscopes

Many recent designs of stroboscopes embody neon tubes. At the National Physical Laboratory use is being made of a thyatron for transferring impulses of a valve-maintained tuning fork to these neon tubes. In its original form the assembly included a self-synchronizing motor driving a translucent disc, the pattern of which was illuminated from behind by the neon tubes. The latter were connected to the secondary winding of a small induction coil and flashed at a frequency of 50 cycles per sec. by a contact-maintained tuning fork. With the object of obviating pitting of the fork contacts, and variations in the rate of the fork, a valve maintaining system has now been substituted for the contact maintenance, and the alternating voltage so produced is fed to a thyatron, the output from which takes the form of a series of sharply-defined pulses of current. These, at the frequency of the fork, are fed to the primary of the induction coil and thereby actuate the neon tubes.



High-speed cathode-ray oscillogram

The arrangement is working very satisfactorily, the effective duration of each flash of light being no more than about 50 micro-seconds. In addition, the thyatron relay serves to reduce the power consumption of the apparatus and makes the stroboscropic parts of the circuit insensitive to voltage fluctuations in the output from the fork.

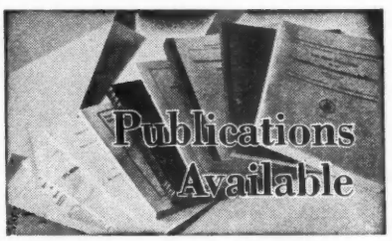
The oscillogram reproduced herewith, taken with a high-speed cathode-ray oscillograph, shows the form of the current impulse actuating the neon tube, against a timing wave with a frequency of 100,000 cycles per sec. It will be seen that the main impluse lasts for about 80 micro-seconds (0.000008 sec.), but the effective light flash, adequate to illuminate dark radial lines on a rapidly rotating disc, has been found by experiment to endure no longer than 50 micro-seconds.—*Engineering*, Dec. 4.

Tire Taxes Slump

November Excise Receipts Reveal Tire Industry's Retrenchment

Indicating the tire industry's drastic retrenchment in the final quarter of 1937, federal excise tax receipts for November show a sharp drop from October figures. The November payment on tires was $1,676,400 compared with $2,953,200 in October and with $2,437,100 in November of 1936. While figures for December are not yet available, it is certain that figures for the entire final quarter will be far below the industry's average for the period since the tax was enforced in 1932. In December of 1936 the tax on tires amounted to $3,319,000.

The first quarter tax in 1937 amounted to $8,418,000 compared with $6,154,300 in 1936. The second quarter tax was $8,176,800 compared with $8,238,400 in 1936 and the third quarter tax was $9,128,100 compared with $9,951,000 in 1936. The total tax for 1936 on tires was $30,837,400 and on inner tubes was $6,404,000. In 1933 the industry's tax amounted to only $19,816,500 on tires and $4,019,500 on tubes.



A new 28-page catalog, No. 1101D, has just been published by C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. It describes and illustrates features of Tag Celectray indicating, recording and controlling **pyrometers** and resistance thermometers, which utilize a phototube, mirror galvanometer and a beam of light.*

"An Automotive Contribution to Railroad Progress," published in booklet form, reports some of the ideas developed at a luncheon recently given by Alfred P. Sloan, Jr., chairman of General Motors Corp., to survey the progress of Diesel motive power

on the railroads in observance of the fortieth anniversary of the completion of the first successful oil-burning Diesel engine.

New catalogs for 1938 compiled by the **National Wheel and Rim Association** will soon be distributed nationally by the member organization. These include a general wheel parts catalog covering all cars through 1938, and a changeover book on passenger car wheels called the "Trade Maker."

Fansteel Metallurgical Corp., North Chicago, Ill., has issued a new bulletin on **Tantaloy tipped tools.** Prices of standard tools and tips are listed, and a number of machine shop uses of Tantaloy are suggested, such as lathe centers, centerless grinder rests, snap gages, and other wear resisting parts.*

Abrasive Co., Division of Simonds Saw and Steel Co., has brought out a new bulletin on centerless **grinding wheels** for production work with particular reference to "K" Bond Borolon vitrified wheels and containing a general recommendation table in terms of the Abrasive Co. wheel markings.*

Details in Homo **tempering of machine-tool chucks** are given in folder F-T625(5), "Tempering As Jacobs Like It," recently issued by the Leeds & Northrup Co., Philadelphia, Pa.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Oppose Stutz Plan

Advance Corp. Protests Grouping Creditors to Get 4% Obligations

Opposition to the latest proposal for settlement of the financial difficulties of the Stutz Motor Car Co. of America developed in a supplementary hearing before Albert Ward, master in chancery last week. The Advance Corp., Chicago finance firm, protested the part of the plan that would group all creditors together to receive 4 per cent obligations.

The Advance firm holds 7 per cent debentures on the Stutz firm. Homer Davidson, head of the creditors' committee said that he felt the Reconstruction Finance Corp. virtually has approved the new plan inasmuch as it has started no action to foreclose on its first mortgage secured by Stutz properties. Davidson said that a disposal of Stutz properties in a sale now would result in creditors receiving little or nothing.

Studebaker 1937 Sales Off ½%

A decrease of one-half of one per cent in its passenger car and truck sales for 1937 has been reported by the Studebaker Corp. with total sales last year of 91,509 units as compared with 91,968 units in 1936.

December, 1937, sales were 4757, as compared to 7577 in December, 1936. This represents a decrease of approximately 37 per cent.

Recession In Limbo at Boat Show

(Continued from page 67)

Twin model. The DeLuxe model differs from the Standard in having a streamlined hood and an outside starting gear. Changes have been made in the fuel tank and in the carburetor. Control is now entirely by one lever which is connected to both the ignition switch and the throttle.

Among the various Evinrude models is a new 16-lb. Ranger with a fuel tank that completely surrounds the flywheel. It develops 1.1 hp. at 3750 r.p.m. and is claimed to operate for six hours on one gallon of gasoline. The Simplex starter, which was introduced on the larger models two years ago, is now being furnished also on the 25-lb. Sportsman and the 35-lb. Twin Sportsman. Another new model is the Weedless Fisherman in which guards spread and depress weeds so that they cannot interfere with the operation of the propeller.

Among exhibitors of gasoline marine engines, the Marine-Engine Division of the Chrysler Corp. featured a new Vee drive with a 2:1 reduction, built integral with the engine. Attached directly to the crankcase of the engine is the reversing gear, and back of this is the Vee drive, from which the propeller shaft extends at an angle underneath the engine. This Vee drive, which is available on Chrysler Ace and Crown engines, permits of the installation of the powerplant in the very stern of the boat, thereby reducing noise and permitting of better utilization of the cabin space. Chrysler also has a straight reduction gear with a reduction ratio of 3.5:1, for use on heavy, low-speed work boats and fishing boats. All Chrysler marine engines are now equipped with oil filters.

Racing engines were shown on a number of stands. Lycoming, for instance, displayed a six-cylinder racing engine of 225 cu. in. displacement, which comes within the 4-liter class. It is fitted with three Zenith downdraft carburetors, each supplying two cylinders, and is rated 175 hp. Three downdraft Zenith carbueretors are used also on a Gray racing engine known as the Fireball, which has 244 cu. in. displacement and is rated 160 hp. at 4000 r.p.m.

Automatic chokes are now provided in Stromberg marine carburetors. Two types of such chokes have been developed. In one the choke valve is slightly opened by the manifold suction when the engine is being cranked, while in another it is opened by a bimetal thermostat enclosed together with a small heating coil in a housing at the side of the air tube. This latter model of automatic choke is mainly for services where engines run only short periods at a time.

American-Bosch Corp. showed the new Bosch magneto with Alnico magnets and gave a demonstration of its firing power in comparison with that of the ZR-4, which was one of the first Bosch models. In the new magneto the windings, breaker arms and condenser are stationary and only the magnetic field revolves.

A newcomer at national motor boat shows is United Motor Service, which displayed a line of electric generators, starters and other Delco electric products.

Calendar of Coming Events

Foreign Shows

German Motor Show, Berlin, Feb. 18-March 6, 1938

Leipzig, Trade Fair, March 6 to 14, 1938

Conventions and Meetings

American Road Builders' Association, Cleveland, Jan. 17-21, 1938

American Society for Testing Materials, Spring Regional Meeting, Rochester, N. Y. March 7, 1938

Machine and Tool Progress Show, Detroit.....March 9, 1938

SAE National Aeronautic Meeting, Washington, D. C. March 10-11, 1938

SAE National Passenger Car Meeting, Detroit, March 28-30, 1938

Contracts to Pratt & Whitney

Pratt & Whitney division of the United Aircraft Corp. has been awarded two War Department contracts totaling more than $1,000,000.

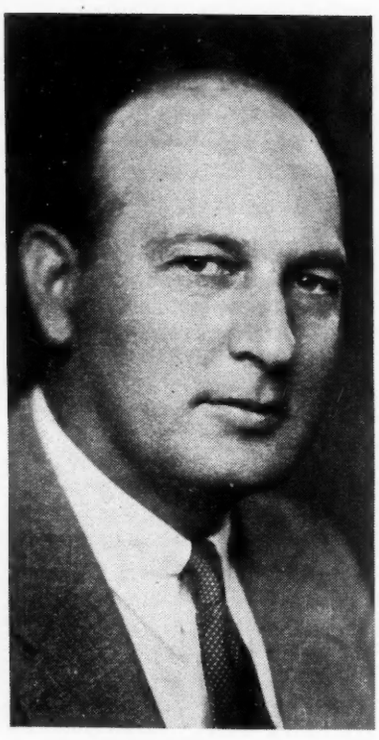
One of the contracts was for 142 engines and spare parts for combat planes now under construction. The other was for spare parts for pursuit planes now in service.

How a Federal Judge's Action Threw

Trial at Milwaukee

By L. E. MEYER*

WHEN Judge Ferdinand A. Geiger of the United States District Court at Milwaukee on Dec. 17 summarily dismissed a federal grand jury investigating finance company relations with automobile manufacturers because he felt that its sanctity had been impaired by negotiations for a consent decree in equity while the jury was still at work, it brought to a halt, temporarily at least, unquestionably the most important proceeding along this line by the Department of Justice. It was the first criminal proceeding and regarded as more serious than three previous attacks initiated by the Federal Trade Commission in civil actions. In it Attorney General Cummings asked the grand jury in Milwaukee for criminal indictments alleging conspiracy to violate the Sherman anti-trust law. Companies involved were Ford, Chrysler and General Motors; also, the Commercial Investment Trust and its affiliate, Universal Credit Corp.; the General Motors Acceptance Corp., and the Commercial Credit Co.



Russell Hardy
U. S. Prosecutor

The case is said to have had its origin in January, 1937, when representatives of the American Finance Conference, composed of independent finance companies, conferred with the Department of Justice. As the result, Attorney General Cummings ordered an investigation, assigning Russell Hardy as special assistant in charge. After nine months of investigation, during which time the AFC cooperated by sending a questionnaire to their dealer customers asking specific cases of coercion and the methods used in applying it, Prosecutor Hardy began the presentation of documentary evidence to the grand jury in Milwaukee on Sept. 20. More than 300 witnesses were subpoenaed, covering corporation executives, records and accounts, but in the main dealers in various states, including New York, Pennsylvania, Maryland, Ohio, Michigan, Illinois, Indiana and Iowa.

It is understood that the Government charged that automobile dealers representing Ford, Chrysler and General Motors are obligated to use the services of designated finance companies, and that dealers who sell retail paper to independent finance companies have difficulty in getting adequate stocks of automobiles. Charges also were made that finance charges are split between finance companies and dealers.

The jury recessed for brief periods a number of times, but after a week's recess ended Nov. 22, it met briefly and took a three weeks' recess, and Prosecutor Hardy immediately returned to Washington. Newspaper dispatches from Washington indicated that conferences were under way between Assistant Attorney General Robert Jackson and counsel for the companies under scrutiny concerning settling of the

(*Turn to page* 76, *please*)

*Milwaukee correspondent, AUTOMOTIVE INDUSTRIES.

Reaction at

By L. W.

IRRESPECTIVE of the merits of the charge that the Administration, as evidenced by "the Geiger case," is moving to undermine the independence of the judiciary, the reason back of the Justice Department's action in directing a grand jury investigation of alleged dealer coercion and monopolistic practices in the automobile finance industry deserves more than passing attention.

Under ordinary circumstances, the complaint brought by independent finance companies would have been a subject for FTC investigation, in which case the Commission would have scrutinized alleged abuses in installment financing and, if found necessary, would have followed up with a cease and desist order. In the event of non-compliance with its order, FTC then would refer the case to the Department of Justice for further action. The Justice Department, for some unexplained reason, put the cart before the horse and launched a grand jury inquiry.

Whether this was a determining factor which prompted Judge Ferdinand Geiger to dismiss the Grand Jury in the case is not known, but the announced reason that Geiger considered it "improper" for the Justice Department to confer with parties to the case while the jury was sitting was responsible for the Cummings letter to the Chairman of the House Judiciary Committee.

Commenting on the letter in which Judge Geiger's conduct was described as "arbitrary, unjust and unfair" in the automobile financing and other cases, the Attorney General explained that he could make "quite a statement" on the subject but that it was up to the House Committee—where impeachment proceedings start—to decide upon what course would be followed. Mr. Cummings has expressed himself as preferring to let the facts speak for themselves until the records in the case are finally made public.

Cummings has repeatedly denied that the Justice Department made overtures in the direction of a consent decree and has insisted that

Finance-Company Case Into a Stymie

Washington

MOFFETT**

"all the proposals came from the companies involved." However, a letter from Henry M. Hogan, assistant general counsel of General Motors Corp., now in the files of Assistant Attorney General Robert H. Jackson, intimated that there had been "coercion" used in efforts to obtain a civil decree.

The letter sets forth the argument that his company would prefer to have "our rights and obligations determined in an atmosphere free from coercion, by some authority constituted by law to carefully try on the merits of the case." Hogan also told Jackson that he wanted the following questions decided upon: (1) whether the finance business is subject to Federal regulation and, if so, what are the appropriate rules and limitations; and (2) whether there have been any violations thereof.

"As you already know," he continued, "the subject is already regulated by statutes in 18 States, and the conflict between State and Federal jurisdiction should be clarified in order to insure uniformity of obligation and make compliance reasonably effective."

The Attorney General has made no decision on what further action will be taken against the three automobile finance companies, but it's the Justice Department's next move. That there will be further action is indicated in the Department's annual report to Congress in which Robert H. Jackson includes the automobile finance case as one of the three "most flagrant" cases pending. He grouped the automobile finance companies as one of "three or four major offenders" whose activities show "the most serious injury to the public."

The opinion prevails in Washington that impeachment proceedings against Judge Geiger will not be ordered by the House Judiciary Committee. The committee has before it letters from the Wisconsin Bar Association which were requested after receipt of the Cum-

(*Turn to page, 76, please*)

**Washington editor AUTOMOTIVE INDUSTRIES.

Observations from New York

By LESLIE PEAT***

WHEN the government's attack on the three largest automobile sales finance companies backfired Dec. 17 with Federal Judge F. A. Geiger's dismissal of the grand jury investigating the companies, the latest of a long series of similar attempts previously projected by smaller, "independent" concerns failed—temporarily, at least.

General Motors Acceptance Corp., Commercial Credit Co., and Universal Credit Corp., the finance companies, and General Motors Corp., Chrysler Corp., and Ford Motor Co. were left in no-man's land with a verbal barrage laid down by Attorney General Homer S. Cummings and New Deal spokesmen against Judge Geiger.

In the meantime, all three companies are doing business at the same stands. General Motors, parent concern of G. M. A. C., Chrysler (which has done the bulk of its dealer financing through Commercial Credit), and Ford, which organized but has severed its official connection with Universal Credit Corp., affiliate of the Commercial Investment Trust, are waiting developments.

Historically, automobile finance companies were formed in the early days of the automobile industry solely because banks had no faith in the future of the business and would not lend money to prospective customers of horseless carriages. Only monied men, or those who could raise money on safer collateral, could buy cars.

Specialized time-payment companies were formed and proceeded to handle both retail and wholesale financing. They developed their techniques with venturesome spirit, learning by failures. It has been estimated that more than 5000 such companies have been formed. Probably more than 1000 are in the business today, and more than 450 report regularly to the Department of Commerce the monthly state of their businesses.

According to the financial statements of the large "associated" companies and the large "independents," as well as reports of the smaller companies, those in business today are doing very well, thank you. They have two national associations: National Association of Sales Finance Companies, and American Finance Conference. The cudgels of the "independents," some of which have become large institutions, are borne by the latter organization. The present turmoil was caused by the American Finance Conference, according to its past-president, David B. Cassat, who publicly stated that he brought the alleged coercive business practices of the "big three" to the government's attention.

Action against these concerns and their associated car manufacturers came to the attention of Robert

(*Turn to page 77, please*)

Homer Cummings
U. S. Attorney General

***Contributing editor, AUTOMOTIVE INDUSTRIES.

criminal allegations by means of a consent decree in equity. It was understood, however, that General Motors declined to sign, claiming it was not guilty of illegal acts and that it could not consent to a complete divorcement of the corporation and the General Motors Acceptance Corp.

When the grand jury met to resume deliberations on Dec. 13, Judge Geiger exploded a legal bombshell by summarily ordering the jury to take an adjournment for one week. He told the jury:

"A question has arisen which has forced me to investigate regarding the proceedings you have been investigating, so I am asking you now to adjourn for one week so such an investigation can be made as the court deems proper."

Prosecutor Hardy immediately protested, saying: "I ask the court to inform the jury that this is only a request on the part of the court, and is not mandatory."

"Why?" asked the court.

Hardy replied: "Because the question of adjournment by the grand jury is a matter for vote by the jury, just as with its other proceedings."

"Your motion is denied," said Judge Geiger.

Hardy then objected to the court's request and asked permission to file a brief. He was permitted to do so and filed his brief after eliciting from the court that the judge's "request" to the jury was to be considered mandatory. The fact that Hardy had a brief prepared indicated that he knew in advance of the court's probable action, which is unprecedented.

Judge Geiger then revealed he had ordered "five persons purporting to be attorneys" to appear before him on Dec. 17 for questioning in connection with matters being investigated by the jury. He said he wanted to learn the nature of recent conversations between these attorneys and members of the Attorney General's department in Washington.

Dec. 17 provided a stirring drama in a courtroom tense with excitement. In turn there appeared before Judge Geiger for questioning and explanations H. M. Hogan, New York, counsel for General Motors Corp.; Clifford B. Longley, Detroit, counsel for Ford Motor Co.; Nicholas Kelley, New York, counsel for Chrysler Corp.; Duane Dills, New York, for Commercial Credit Co., and Phillip W. Haberman, New York, for Universal Credit Corp. and Commercial Investment Trust.

Trial at Milwaukee

(Continued from page 74)

Sharp clashes occurred frequently between the attorneys and Prosecutor Hardy, and between Judge Geiger and Mr. Hardy.

Mr. Longley explained that the conversations in Washington were initiated by E. C. Kanzler, president of Universal Credit Co., who conferred with Joseph Keenan, assistant to the attorney general, on Oct. 14. A written statement by Mr. Kanzler, introduced by Mr. Longley, said Keenan assured him it was proper for him to discuss the subject with Keenan. Kansler thereupon, according to his statement, suggested his client might consent to abandon the practices complained of if the prosecution were dropped or at least reduced to a civil proceeding. Keenan referred him to Assistant Attorney General Jackson, in charge of anti-trust litigation, who was quoted as saying that the proposal could be discussed only if all the companies were represented.

Longley said the automobile-finance attorneys were given to understand that the jury itself had proposed certain provisions of a proposed consent decree in equity, that he was convinced no one believed a crime had been committed and that all efforts were directed merely toward a proper settlement of the dispute, adding: "It was entirely proper. Why shouldn't we talk it over?"

Judge Geiger interjected: "Why should you?"

Longley replied: "Because it was not right for the Government to continue the grand jury proceedings unless it believed us guilty in good faith. The reason I did not stipulate to the decree was that it proposed to prohibit perfectly legal practices of long standing."

In his statement, Mr. Hogan of General Motors Corp., said he had declined to enter into the consent decree. He quoted Mr. Jackson as telling the automobile-finance company counsel that the Government was not interested in the "punitive aspects" of the situation, and as saying, in respect to the Government's dropping its demand for indictments: "While the ultimate decision is up to the jury, I never knew a prosecutor yet who could not control a grand jury." Mr. Hogan insisted the idea for the conferences originated in the Attorney General's office.

Mr. Dills, of Commercial Credit Co., readily conceded the purposes of the conferences, from the standpoint

(Turn to page 90, please)

Reaction at

(Continued from

mings letter. The information is expected to carry considerable weight with members of the committee, many of whom know Judge Geiger as one of the most rigid in maintaining the dignity of the court, and one of the most severe in punishing breaches of legal ethics in his 26 years on the Federal bench in the Eastern district of Wisconsin.

Judge Geiger's record has been the subject of Congressional discussion on several previous occasions. Under the prohibition law his celebrated "padlock decisions" were assailed in the Lower House. Early in 1937, the House Patents Committee threatened official action against Geiger after he had dismissed 17 copyright suits brought by the American Society of Composers, Authors and Publishers. He also dismissed six alleged violators of income tax laws recently because the Government had negotiated with some of the defendants for payment of back taxes.

As in the current automobile finance case, the Judge held that outside negotiations were an "imposition" on the jury.

The question of holding consent decree conferences while a grand jury was considering a case was recently the subject of a question asked at a White House press conference. President Roosevelt replied that he did not know about that. He added that he disliked to criticize the courts.

At the same conference, Mr. Roosevelt related the story of a friend in the automobile business, who, he said, had complained that more liberal finance terms adopted by manufacturers had been a contributing factor last year in speeding up sales of cars out of proportion to the demand. The President used the analogy in clarifying his remarks in a recent speech during which he referred to "high pressure salesmanship which creates cycles of overproduction within given industries and consequent recessions in production until such time as the surplus is consumed."

A few days later, William Knudsen, president of General Motors, told a Senate Committee that independent finance companies had instituted the more liberal finance terms—the 24-month contract—and that although his company considered them danger-

Washington

page 75)

ous had followed suit to meet competition.

The defendant finance companies held at the Milwaukee trial that they face rigorous competition from the independents and that it is on the increase with the largest companies getting a diminishing share of the business as a result. Government attorneys charged anti-trust violation and alleged dealer coercion in dictating a particular finance company plan.

The House Committee on the Judiciary decided Tuesday this week to have the Judge Geiger charges aired. It voted to ask the Department of Justice and the Wisconsin and Milwaukee Bar Association to send representatives before the committee, the former to support charges against and the latter to uphold its position in defense of Judge Geiger. The Bar Association has expressed resentment against the Department of Justice for making charges of so-called autocratic procedure against Judge Geiger.

Mr. Sumners, chairman of the Judiciary Committee, said it had not been determined yet whether the proposed meeting of the Department of Justice and Bar Association representatives would be held in an executive or public session.

The committee indicated that it is equally concerned over the charges by Attorney General Cummings against the judge and the defense of the judge by the Bar Association. "There are two sets of charges before the committee," Mr. Sumners observed: "Draw your own conclusions.'

Observations from New York

(Continued from page 75)

Jackson, the champion trust buster of the New Deal. Milwaukee was chosen for the battle ground, and last April a grand jury was called to study these practices.

Delay followed delay in the government's presentments against the "big three," until Judge Geiger decided to inquire into the proceedings. He found that the government attorneys in Washington had talked with attorneys for the finance companies under investigation as well as with counsel for the car companies. Furthermore, he discovered that the government prosecutors had attempted to make a "deal" whereby the car makers would sign agreements to desist from the alleged practices.

This attempt irked the judge and brought about the summary dismissal of the grand jury.

According to close observers, the charges outlined by Mr. Cassat are similar to those previously brought by the "independents" against the "big three." They include:

1. Discrimination by car manufacturers in favor of their "associated" finance companies against all others in the field.

2. Coercion of dealers by urging, and in some cases forcing, them to use the services of their "associated" finance companies.

3. Alleged illegality of reserves set up by these finance companies, and which are paid to dealers upon the completion of the deferred payment contract.

4. Monopolistic affiliation between car companies and their "associated" companies.

The same line of objections raised by the independent finance companies are held to have been the chief reason for the failure of the automobile finance business to agree on a code during the late N.R.A. days, and have been used freely in selling among the "independents."

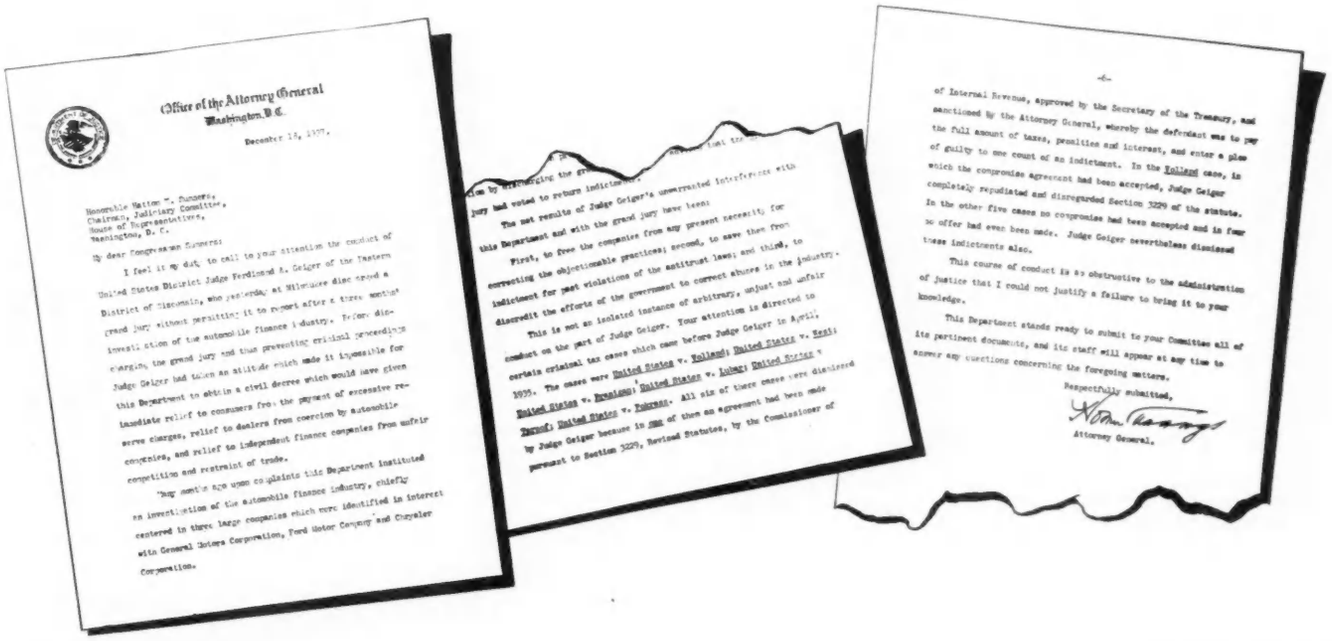
That the arguments are strong sales points among dealers cannot be questioned. First, a dealer can stay in business only if he can maintain his franchise with a manufacturer.

Second, the low rate offered by the "big three" in wholesale or floor-plan financing gives these companies the "in" in retail sales financing.

Third, the dealers' books are under constant audit by the manufacturer. This gives the finance companies close to the manufacturers a strong advantage in keeping the business of the dealer, the "independents" charge.

General Motors is not inclined to divorce G.M.A.C. Ford has completely severed Universal Credit from its corporate structure, and Commercial Credit is no longer a part of Chrysler.

The position of General Motors, as found in public statements from time to time, is that the company wants to assure its customers of quick financial service at low rates. This it can do in a controlled finance company like G.M.A.C., although customers may arrange financing any way they choose.


Office of the Attorney General
Washington, D.C.

December 18, 1937.

Honorable Hatton W. Sumners,
Chairman, Judiciary Committee,
House of Representatives,
Washington, D. C.

My dear Congressman Sumners:

I feel it my duty to call to your attention the conduct of United States District Judge Ferdinand A. Geiger of the Eastern District of Wisconsin, who yesterday, at Milwaukee discharged a [illegible] grand jury without permitting it to report after a three months' investigation of the automobile finance industry. Prior discharge, the grand jury had thus prevented criminal proceedings [illegible] Judge Geiger had taken an attitude which made it impossible for this Department to obtain a civil decree which would have given immediate relief to consumers from the payment of excessive re-serve charges, relief to dealers from coercion by automobile companies, and relief to independent finance companies from unfair competition and restraint of trade.

Many months ago upon complaints this Department instituted an investigation of the automobile finance industry, chiefly centered in three large companies which were identified in interest with General Motors Corporation, Ford Motor Company and Chrysler Corporation.

jury had voted to return indictments [illegible] by unwarranted interference with

The net results of Judge Geiger's unwarranted interference with this Department and with the grand jury have been:

First, to free the companies from any present necessity for correcting the objectionable practices; second, to save them from indictment for past violations of the antitrust laws; and third, to discredit the efforts of the government to correct abuses in the industry.

This is not an isolated instance of arbitrary, unjust and unfair conduct on the part of Judge Geiger. Your attention is directed to certain criminal tax cases which came before Judge Geiger in April, 1935. The cases were United States v. Holland; United States v. Stahl; United States v. Brenning; United States v. Lohse; United States v. Bernet; United States v. Poirson. All six of these cases were dismissed by Judge Geiger because in one of them an agreement had been made pursuant to Section 3229, Revised Statutes, by the Commissioner of

-2-

of Internal Revenue, approved by the Secretary of the Treasury, and sanctioned by the Attorney General, whereby the defendant was to pay the full amount of taxes, penalties and interest, and enter a plea of guilty to one count of an indictment. In the Holland case, in which the compromise agreement had been accepted, Judge Geiger completely repudiated and disregarded Section 3229 of the statute. In the other five cases no compromise had been accepted and in four no offer had even been made. Judge Geiger nevertheless dismissed these indictments also.

This course of conduct is so obstructive to the administration of justice that I could not justify a failure to bring it to your knowledge.

This Department stands ready to submit to your Committee all of its pertinent documents, and its staff will appear at any time to answer any questions concerning the foregoing matters.

Respectfully submitted,

Attorney General.

THE CHILTON ROUND TABLE

In order to give readers of AUTOMOTIVE INDUSTRIES a clue to certain merchandising and service aspects of the automotive industry which are normally outside the scope of an industrial publication, we present herewith excerpts from the January issues of the four other magazines published by the Automotive Division of the Chilton Co.: *Automobile Trade Journal, Commercial Car Journal, Motor Age,* and *Motor World Wholesale.*

From MOTOR AGE

"Automobile racing is currently having its 'face lifted.' Throughout the United States—and in Europe—speed drivers and their mechanics are studying blue-prints conforming to the new set of rules ordered for the 1938 season. . . . As a result of the International Formula adopted by the International Sports Commission thousands of dollars worth of expensive racing equipment will go into the 'melting pot' and thousands more will be spent on the necessary revisions."

From COMMERCIAL CAR JOURNAL

"Only a few years ago fleet men were ingeniously working out appliances for the passenger cars in their fleets, the sole object of which was to make the cars operate economically. . . . The passenger car manufacturer feeling that his first duty was to the individual operator produced a vehicle of increasing performance and left the fleet operator to shift for himself. . . . So well did the fleet fraternity shift that in a short time it had installed throttle stops, restriction plates, manifold shields, smaller carburetor jets, etc., which choked off part of the performance and consequently reduced the cost of operation. These appliances were adopted by the factories as part of the car which was merchandised to fleet operators, to which were added favorable gear ratios, smaller carburetors, and in some cases, higher compression cylinder heads."

(Turn to page 91, please)

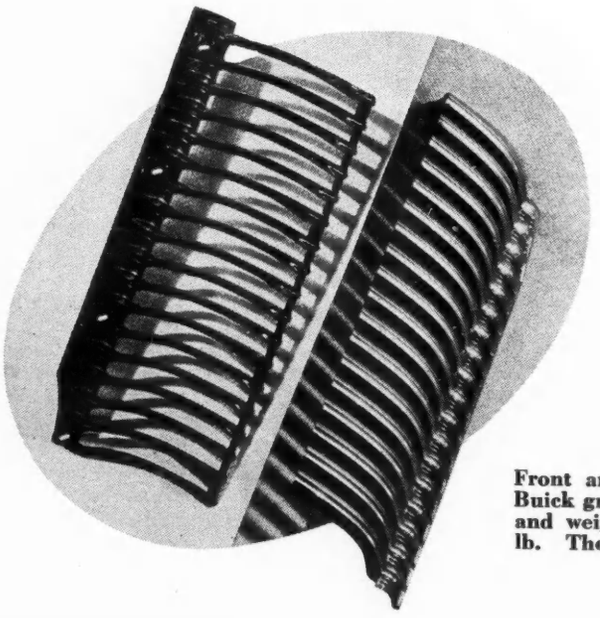
Die Casting Sets

By HERBERT CHASE

MARKED increase both in the number and variety of zinc-alloy die castings is a noteworthy feature of 1938 automotive products. This indicates that the advantages of die castings are becoming more generally appreciated. Demands for improved appearance account for a large proportion of current uses. In this, as in some other directions, the die casting has proved to be the most economical means of securing the results desired.

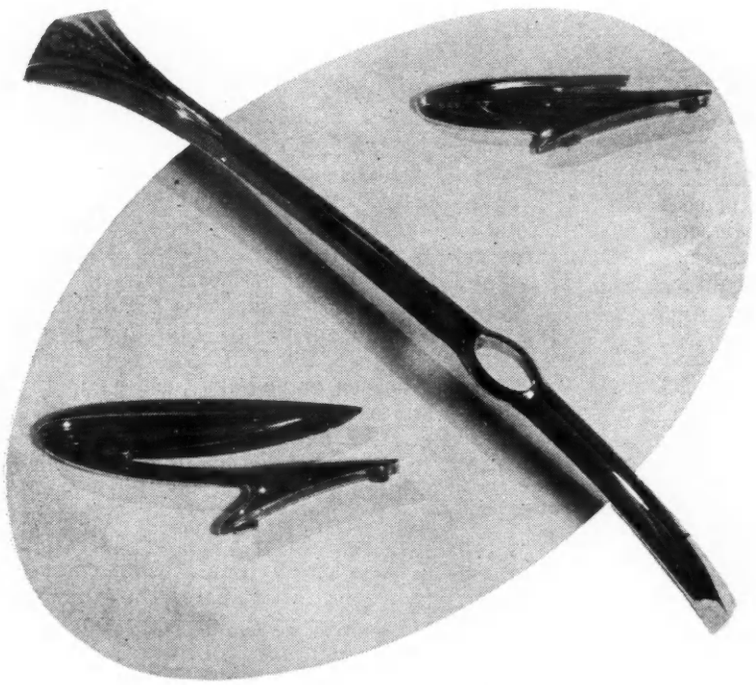
For some parts of certain 1938 cars — especially radiator grilles — there has been a return to die castings after they had been abandoned in 1937 models in favor of stamped units. It is the general opinion among automotive engineers that die cast grilles are here to stay. This return to die castings is attributable to dealer demand, to improved facilities for producing and finishing die castings of large size, and to a realization that a certain much-desired appearance cannot be secured in any other way, except at a tooling cost (for stampings) which is prohibitive unless quantities reach several hundred thousand. Even then the results secured do not duplicate those attained with die castings. Tooling costs are nearly always much lower for the die casting than for the stamping, unless the latter is of very simple shape.

Of great importance, also, is the consideration that both dimensions and contours are held within closer limits when a die casting is employed, which simplifies various production and assembly problems on adjacent parts. This is not a reflection on the stamped or drawn part, which has a far wider field of utility than the die casting, but is an inherent difference resulting in part from differences in the metals used and the methods by which they are fabricated. The die casting permits of sharp, "crisp" lines, well defined details and, if necessary, square edges and corners, not feasible in stamped parts. Each die casting is substantially an exact duplicate of every other one produced in the same die, and the latter does not wear in any significant degree, as do stamping and drawing dies. These facts



Front and rear views of the Buick grille, die cast in halves and weighing in all only 16 lb. The ribs have a channel section.

New Pace in 1938 Models



Center bar for Ford radiator, and radiator ornaments for Hudson cars, have depressed portions purposely roughened slightly to receive colored enamel, the latter being baked on over the plated finish.

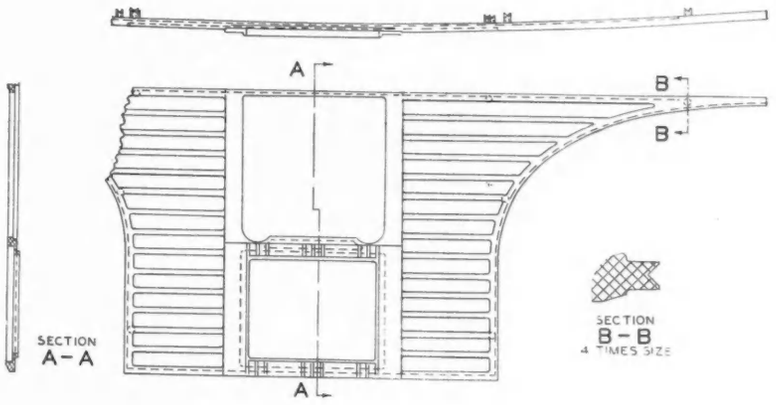
avoid difficulties encountered with drawn parts, especially in making fits at assembly, and these advantages were stressed by nearly every designer among the many with whom the writer discussed the subject before preparing this article. They are reiterated here because they account for many of the current uses of die castings and have a distinct bearing on the design of today's motor vehicles.

Zinc Alloys Employed

There has been no pronounced change within the last year or two in the alloys employed for making zinc-base die castings, but one alloy, commonly known as "Zamak No. 5," has been added to those listed in S.A.E. standards, where it is designated as "No. 925." This alloy is intermediate, both in composition and in most physical properties, between "Zamak No. 2" (S.A.E. No. 921) and "Zamak No. 3" (S.A.E. No. 903). No. 2 was used almost exclusively a few years ago, and it still is in extensive use. No. 3 is now the most widely used for automotive parts and is gaining in extent of use, whereas the use of No. 2 shows a nearly proportional decrease. Although the proportion of No. 5 is still small, it is increasing. According to S.A.E. specifications, "this alloy may be used in place of No. 921 (No. 2) where additional permanence and properties are needed. It may be used in place of Alloy No. 903 (No. 3) where additional corrosion resistance together with satisfactory permanence of dimensions and properties are required. Alloy No. 925 (No. 5) is more sensitive to tin contamination than alloys 921 and 903, and the tin limit is therefore set at 0.002 per cent for this alloy, as compared with 0.005 per cent for the others."

So far as dimensional changes through aging are concerned, they are lowest for No. 3, intermediate for No. 5 and highest for No. 2, but there are few automotive applications in which the dimensional changes in any of the alloys are of sufficient moment to affect the utility of the part in which they are used. As regards these three alloys, the most important physical property which is affected by aging is that of impact strength. In the No. 2 alloy, impact strength (Charpy) is reduced from about 19 to about 3 ft-lb. in five years of indoor aging. No. 3, which has an original impact strength of 20 ft-lb., shows only a slight decrease after five years of indoor aging, to 18 ft-lb. No. 5, with an initial impact strength of 17 ft-lb., shows 16 ft.-lb. after five years. These data and those given in the accompanying table, which also gives the composition of the alloys, were compiled by The New

Automotive 11 Materials

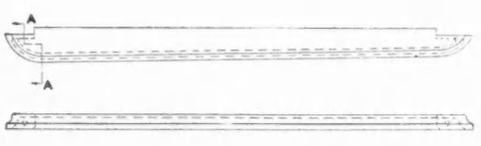


Instrument panel grille as applied on DeSoto models. Although the grille is crowned as viewed from the top, the integral fastening lugs all have their axes parallel, thus facilitating removal from the die without requiring slides in the latter.

Jersey Zinc Company Laboratory.

It is essential, of course, that zinc-alloy die castings be made from high-purity zinc and that S.A.E. specifications be rigidly adhered to. Frequent checks should be made to insure that the very low limits set on lead, tin and cadmium content are maintained, and die castings should be purchased from sources where the importance of these limits is understood and the limits are adhered to.

Zinc alloys used in die casting are characterized by unusual toughness (high impact strength) and good ductility as compared with most common cast metals used in American passenger cars. Breakage in service rarely occurs, except through abuse, even though millions of vehicles in which many die castings are employed see extensive use at sub-zero temperatures, at which the impact strength of these die castings is materially decreased. At ordinary room temperatures, die casting of common shapes can be bent through a considerable angle without fracture, and if warmed to about the boiling point of water, they can be formed without injury. Holes are often pierced in punch operations, but in such operations the castings should not be much below normal room temperature, and should be adequately supported, of course.



Louvre casting as used on Cadillac hoods. These light castings are grouped in banks of three.

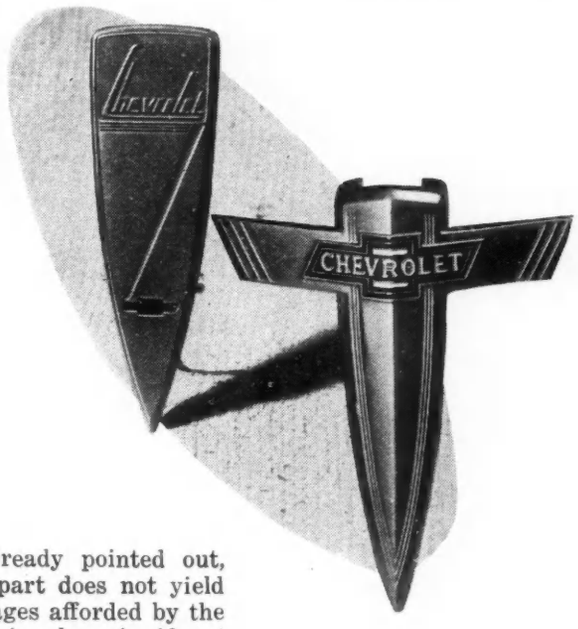
Quantities Used

The automotive industry is the largest consumer of zinc-alloy die castings. It purchases many of these from several large and many smaller plants devoted entirely to die casting, and in addition has within its own plants several shops in which there are a large number of die-casting machines producing castings in zinc alloys only. A typical car in the medium-price range in 1937 employed no less than 50 zinc-alloy die castings. One 1938 model just above the lowest price range is using on the four-door sedan model a total of 76 die castings. These figures include, of course, both body and chassis parts.

Although cars in the lowest price range make use of fewer and lighter die castings, they all have a large number, including many serving purely structural or utilitarian purposes, as well as those performing chiefly decorative functions. In the somewhat higher price range there is, in general, an increase in the number and weight of die castings employed. This is partly because die castings in some of the forms used produce an appearance not duplicated otherwise, and thereby helps the ultimate consumer to differentiate immediately between a low-cost and a higher cost product. One body designer characterizes the difference as amounting to that between "Kresge and Tiffany" merchandise. Another and similar reason is that the die casting has a feeling of solidity, being relatively stiff as compared to sheet-metal parts which, though adequate structurally, have a springy or "tinny" feel. Whatever may be said of these considerations from a strictly engineering point of view, the fact remains that they exert a powerful influence on sales curves, as well as in design—an influence which no engineer mindful of the need for producing an article which will sell readily can afford to overlook.

Die castings are sometimes criticized on the ground that they weigh more than pressed metal parts answering the same or quite similar

Dodge grille formed from three major sections, all of which are die cast.



Chevrolet radiator and trunk emblems have recesses which are filled in by masking and spraying with enamel, and by the use of striping brushes over the plated finish.

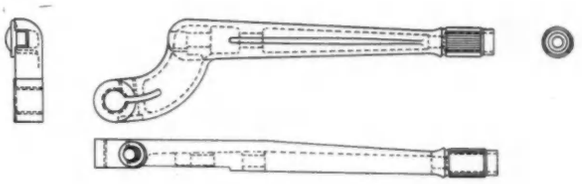
purposes. As already pointed out, the sheet metal part does not yield the same advantages afforded by the die casting. It is also significant that, although some radiator grilles in die-cast form weigh about 30 lb., three among the smartest appearing ones on 1938 models, those of the Olds 8, Buick, and Lincoln-Zephyr, weigh only 13.5, 16 and 9 lb., respectively. This definitely proves that, when weight reduction is desired, it can be secured through designing with this point in mind. Even these weights will doubtless be lowered in future designs, especially if the designer cooperates closely with the die caster and gives him time to work out dies in which the section thickness of the casting can be made as light as casting conditions permit. A grille in which long bars of thin section are used, however, should have these bars tied together at intervals by light crossribs forming a part of the casting. If desired, it can be so placed that the reinforcement will not be visible from the front. This practice retains the solidity which is an advantage of the die-cast grille.

Small die castings are made commercially today in section thickness of 0.030 in. or less, which is well below that feasible for most automotive parts. Although the section thickness feasible in large castings is much above this approximate minimum for small ones, it is safe to predict that large castings will be made in thinner sections in the near future. It should be remembered, also, that it is possible to build up an assembly from relatively small, thin-wall die castings, where a heavier section would be required if the unit were made in one piece. In some instances, also, the built-up assembly may involve a lower die cost and lower cost in buffing and finishing. Such possibilities are deserving of close study by all designers interested in weight reduction and cost reduction.

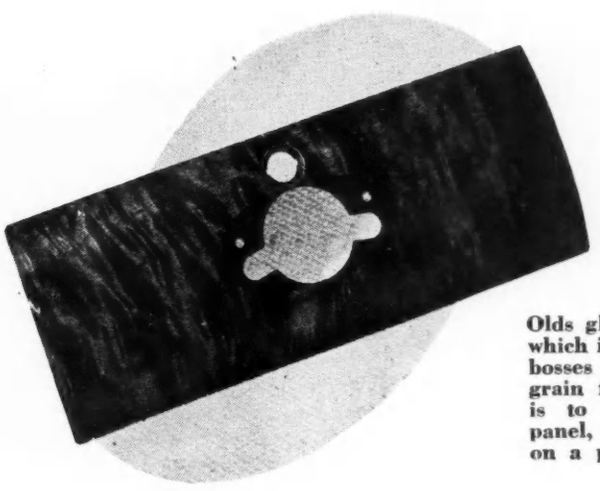
Important Applications

HARDWARE AND FITTINGS: Nearly all automotive hardware and fittings, both interior and exterior, are now produced in the form of zinc-alloy die castings, the percentage having increased over former years. Die castings serve admirably for this purpose, because they are low in cost and readily produced in the ornamental designs commonly required. The trend has been toward heavier parts, especially in outside door handles, chiefly on an appearance basis. It is possible, however, to retain massive appearance without excessive weight providing the design permits of suitable coring. In such instances, as in all designing of die castings, close cooperation between designer and die caster is likely to yield best results. Similar cooperation often results also in lower casting, buffing and finishing costs, especially where quantities are sufficient to warrant a setup for automatic buffing. Unfortunately, in hardware, as in many other parts, orders for dies often are not placed until shortly before production is required, with the result that economies which might be gained through better planning in advance are lost.

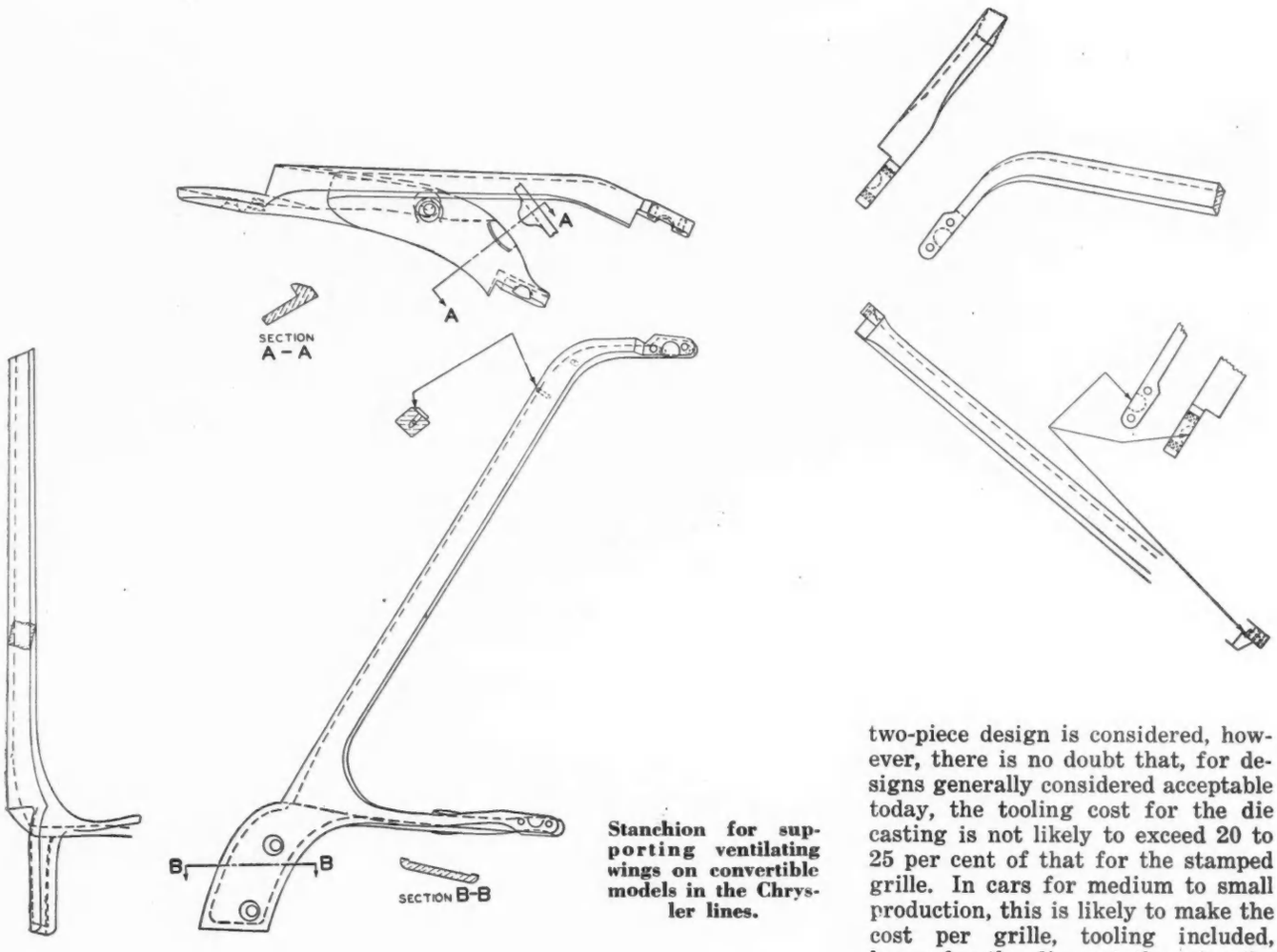
Almost the only criticism as to service relating to die-cast hardware is that pertaining to plating of exterior parts on which pitting or "blistering" sometimes occurs. It is quite generally agreed, that a first-class job of plating goes far toward avoidance of such criticism. Correct and carefully controlled plating practice is necessary to achieve dependable results, but, assuming that the methods followed are correct, the most important consideration is an adequate thickness of plate. A total thickness of 0.001 in.



Shifter lever as used under steering wheel on Buick cars. The lever controls the semi-automatic transmission and has both tubular and channel sections.



Olds glove-compartment door which is die cast with integral bosses and is given a wood-grain finish. When a clock is to be mounted on the panel, an opening is pierced on a punch press to receive this unit.



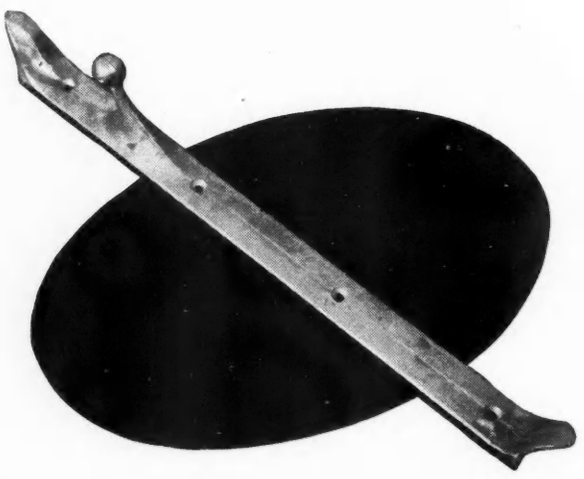
Stanchion for supporting ventilating wings on convertible models in the Chrysler lines.

minimum is desirable, and if the first coat is copper it should not be less than 0.0003 in. in thickness. Some authorities consider nickel plating directly on the casting superior to copper plus nickel, which is now most generally employed, but there is much difference of opinion in this regard. These remarks apply, of course, to the plating of other die castings as well as to hardware. All exterior and some interior hardware is given a flash coat of chromium over the nickel. This adds little to the enduring properties of the plate, but prevents tarnishing and yields a bluish color as compared to the yellowish tinge of nickel.

Some interior hardware die cast of zinc alloys is now being finished in colors, using a coating of nitrocellulose lacquer or enamel. This is reported satisfactory in service and may see wider use if modern styling so decrees. To withstand mechanical wear, especially on handles, proper preparation of the surface and a coat of enamel of adequate thickness are essential.

GRILLES: Radiator grilles are die cast chiefly for reasons of appearance and solidity, as already pointed out, but dimensional uniformity and the fact that zinc alloys are nonrusting are other important reasons. Although the die-cast grille is sometimes more expensive than the stamped variety, this depends in part on the appearance standard required. It depends also on tooling costs, which again vary greatly with different designs. If a one-piece or two-piece design is considered, however, there is no doubt that, for designs generally considered acceptable today, the tooling cost for the die casting is not likely to exceed 20 to 25 per cent of that for the stamped grille. In cars for medium to small production, this is likely to make the cost per grille, tooling included, lower for the die cast than for the stamped grille. It is significant, however, that in nearly all stamped grilles, except for some of the lowest priced cars, some die castings are required to yield the finished effect specified, and the cost of this must be considered in arriving at the total cost.

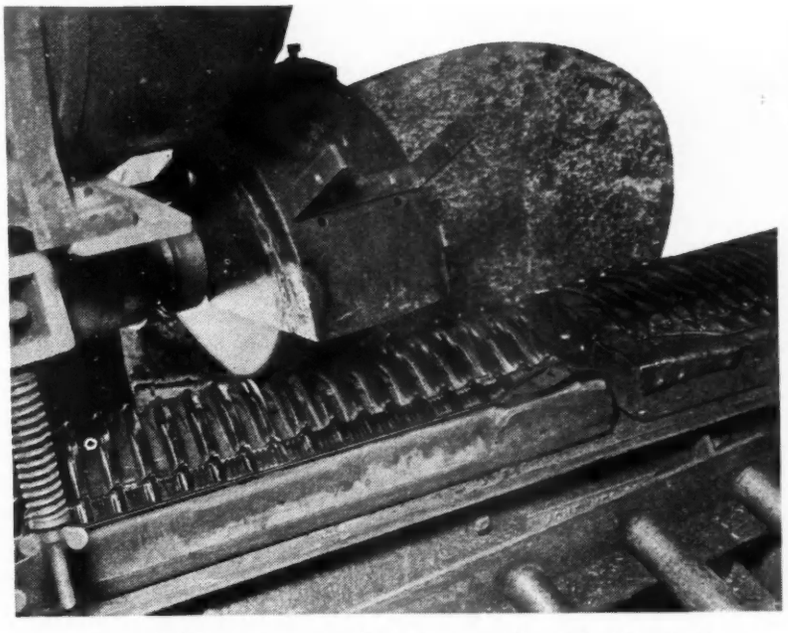
That an enduring enamel finish can be applied to die castings, even for outside exposure, is amply demonstrated by experience with die-cast tail lamp and head-lamp parts.



Center bar for Packard windshield which includes, as an integral part, a ball support for the rear vision mirror.

many of which are so treated with excellent results. Prior to finishing, the die castings are given a phosphate or other similar treatment, and the finish is baked on at a temperature which in the case of S.A.E. 921 should not exceed 285 deg. Fahr. for one hour. With a proper grade of enamel over a correctly treated die casting, an enduring finish is secured.

Many grilles for radio application in passenger cars are now being die cast with excellent results. No special problems are involved. The chief consideration is to select a design which lends itself to casting and finishing (including polishing if plating is to be done) and entirely satisfactory results are secured. Designs which could not be readily stamped are possible, including some with integral studs for quick attachment with "speed nuts." The latter are reported in use to advantage also in fastening two-piece radiator grilles to supporting parts.

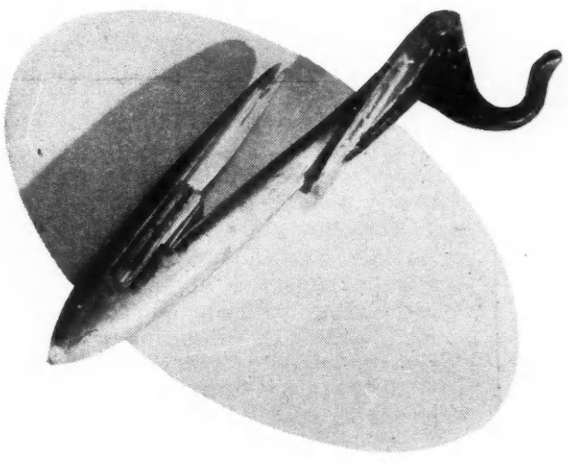


One of the semi-automatic set-ups employed by Ternstedt for polishing radiator-grille die castings prior to plating, the Buick grille being shown in this view.

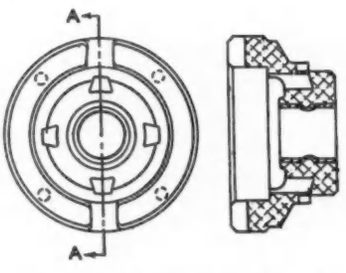
EXTERIOR TRIM: Numerous die castings are employed for exterior trim in such parts as body moldings, hood louvers, lamp stanchions, front-apron decorations, rear-wheel-cover fastenings, name plates and emblems, in addition to decorative parts for stamped radiator grilles, already mentioned. Such parts are almost ideal in die cast form. They are non-rusting, though not entirely free from corrosion, unless protected by a proper finish, and are cast with surfaces so smooth that, except for the removal of parting lines, no grinding is needed. Moreover, only light buffing is required before plating. Lines are sharper, and detail is better than in stamped, rolled or drawn parts. Fastening bosses or studs are often cast integral and do not require the special fastening elements usually needed with sheet-metal parts. Moldings up to 60 in. or more in length are die cast readily.

This year there are fewer die cast louvers—in certain cases partly because other changes in design make louvers unnecessary. In other instances, the die casting has been displaced by a lighter stamping. Some louver die castings used in the past have been made needlessly heavy; but that a light and inexpensive die-cast fitting at louver openings is possible is demonstrated by Packard and Cadillac designs. In the latter, a series of small die castings of thin section, all made in the same die and inexpensively handled in polishing and plating, are grouped on hood sides with pleasing results. Tapped holes in integral bosses of the castings provide a simple screw fastening. Other similar die castings are fastened in place by drive screws, self-tapping screws, or speed nuts, which saves the cost of tapping

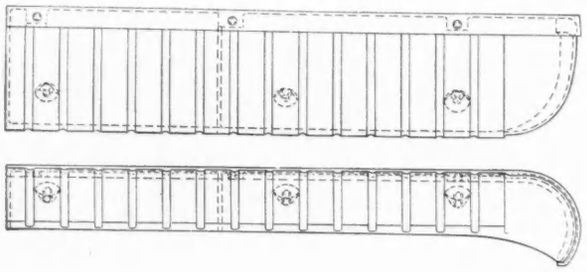
As for many years past, all or practically all, radiator ornaments are die cast. Parts of this type cannot be duplicated in forms so satisfactory or so inexpensive by any other method. This year some ornaments of this type serve also as latch handles for alligator hoods. Color is sometimes added with a strip of plastic, or by using a striping brush in recesses provided for this purpose. As there has been some trouble in making enamel adhere over plating, at least one die caster is leaving the surface to be striped or filled in slightly roughened, thereby providing a "tooth" to anchor the enamel.



Radiator ornament which has a C-shaped steel insert serving as a latch for an alligator hood.



Die-cast piston rod guide for shock absorbers, with inserted brass bushing cast in place and subsequently diamond bored.



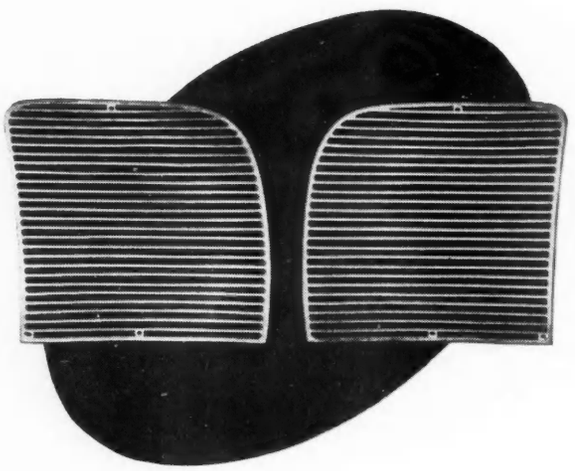
Die-cast running-board end fittings as employed by Cadillac.

In general, the enamel applied over plating should be baked, but it requires a good job of plating to avoid blistering of the plate during baking.

INTERIOR TRIM: More interior trim parts are being die cast this year than ever before. This applies not alone to hardware and radio grilles, already mentioned, but to many instrument-board fittings, including glove-compartment doors, radio-control panels, instrument frames and bezels, ash-receiver parts and the like. Here again, fine appearance at low cost, accurate dimensions, ability to secure intricate forms in a one-piece unit and freedom from rusting are usually controlling considerations. Thin sections and light weight are attained when specified, and smooth surfaces suitable for either plated or organic finishes are secured. Many of the parts are plated to contrast with an instrument panel in grained or solid color, but others have the same finish as this panel, including the graining.

Parts such as glove-compartment doors, when die cast, have the advantage that hinges and bosses for locks and attached parts can be made integral. Dimensions and contours are uniform, and the part is sure to fit the mating part if the latter is uniform in size and shape itself. Where instruments are to be supported by the die casting, it can be recessed or provided with mounting bosses without using extra parts which might result in rattles. It is not necessary to add a noise-deadening material.

An interior part which is both decorative and structural, and now furnished extensively in die-cast form, is the hub for deluxe steering wheels. This part is readily die cast, and one engineer reports tests in which the die-cast hub now used has twice the breaking strength of the malleable iron hub previously em-



The Lincoln-Zephyr two-piece grille in which relatively small die castings are employed.

ployed under torsional loads similar to (but greater for test purposes than) those applied in service. Such hubs have—or can have—the metal economically disposed, have the desired smooth exterior, and can be cored out or receive inserts for attachment of the wire spokes employed. Some are plated, and some are given a baked enamel finish.

Horn rings are among the other interior parts now die cast with economy and fine appearance. The die casting, naturally, is made in one piece and with spoke and rim sections precisely as required.

MECHANICAL PARTS: Such die cast parts as carburetor bodies, fuel pumps, and windshield wipers have been in use so long and are so patently adaptable to economical production that little need be said concerning them. Today, many such parts are given what is termed the "Cronak" treatment, consisting of a short dip in a chromate solution. This treatment yields a film which is resistant to corrosion and prevents oxidation of the surface of the cast-

Physical Properties of Zinc Alloys Most Commonly Used in Die Castings

Alloy		Zamak No. 2* S.A.E. No. 921	Zamak No. 3* S.A.E. No. 903	Zamak No. 5* S.A.E. No. 925
Designation		A.S.T.M. No. 21	A.S.T.M. No. 23	
Composition per cent	Copper	2.5 —3.5	0.10 max.	0.75—1.25
	Aluminum	3.5 —4.5	3.5 —4.3	3.5 —4.3
	Magnesium	0.02—0.10	0.03—0.08	0.02—0.08
	Iron	0.100 max.	0.100 max.	0.100 max.
	Lead	0.007 max.	0.007 max.	0.007 max.
	Cadmium	0.005 max.	0.005 max.	0.005 max.
	Tin	0.005 max.	0.005 max.	0.002 max.
high purity (99.99%) Zinc		Remainder	Remainder	Remainder
Impact Strength (Charpy) ¼ in. x ¼ in. test bar ft. lb. As cast		19	20	17
After 5 yr. indoor aging		3	18	16
Tensile Strength Lb. Per Sq. In. As cast		47,900	40,300	44,500
After 5 yr. indoor aging		49,400	33,800	37,700
Expansion after 5 yr. indoor aging in. per in.		0.0011	0.0001	0.00012
Brinell Hardness		83	74	76
Specific Gravity		6.7	6.6	6.7
Weight lb. per cu. in.		0.24	0.24	0.24

* Zamak Alloys as furnished by The New Jersey Zinc Company are produced with alloying elements held within closer limits than here given.

ing. It is especially helpful where moisture may stand in contact with the metal and result, without this treatment, in the formation of white oxide. Such corrosion does not ordinarily penetrate beyond the surface of the casting, but may be sufficiently bulky to interfere with the correct functioning of parts if allowed to accumulate. Use of the Cronak treatment has been highly successful in preventing difficulties on this score.

Among the newest die castings in the "mechanical" category are some valve and other parts used in the Evans vacuum gear-shifting system. Some of these parts require core work and close-fitting surfaces which would make the parts expensive if produced by any other means. Only very light cuts are needed in doing such machining as is required, and much the same is true of most die castings in which any machining is necessary. Somewhat similar parts have been employed in large lots for several years on Bendix braking, gear-shifting and clutch-operating mechanisms, with results that are reported to be highly satisfactory.

Fairly typical of good mechanical applications is the die cast piston-rod guide of which several million a year are used in the direct-acting shock absorbers produced by General Motors and Chrysler subsidiaries. This is a relatively simple casting, but requires very close limits on the finished surfaces, including the inside of the bronze bushing which is cast in place and diamond-bored. Originally this casting, made in S.A.E. 903 alloy, had no bushing, the

(Turn to page 92, please)

Automotive Materials NEW DEVELOPMENTS

Bakelite's Polystyrene Molding Material

Latest plastic development of the Bakelite Corp. is a polystyrene molding material, designated as XMS-10023, which is said to possess several properties long sought in other types of molding materials.

As stated by the manufacturer, the new resinoid retains an ability to be softened and distorted at higher temperatures. Tests indicate that parts of the ordinary type will withstand temperatures up to 176 deg. Fahr. without distortion, when the load involved is simply their own weight. Molding shrinkage is approximately 0.002 in. per inch. The material is moldable either by the older compression method or by the newer injection machines.

Wtih regard to the electrical properties of Bakelite polystyrene, the specifications list a loss factor of less than 0.00053, a power factor of less than 0.0002. Its dielectric strength is given as more than 500 volts per mil; its resistivity 10^{5} megohm-centimeters; and its arc resistance 240-250 sec. (proposed A.S.T.M. method).

Water absorption of the new plastic is only 0.05 per cent on a 2½-in. disc, after 318 hours of total immersion. It is said also to be unaffected by ordinary concentrations of both acids and alkalies.

Additional general characteristics of Bakelite polystyrene are as follows: tensile strength, 5000 to 5500 lb. per sq. in.; impact strength, 0.16 to 0.2 lb.-ft.; flexural strength, 7000 to 7500 lb. per sq. in.; specific gravity, 1.05 to 1.07; transmission of light, about 87 per cent.

Although this material is available at the present time in the colorless state only, it is easily colored, and in the future it is intended to produce it in a full range of colors.

Belmalloy; A Pearlitic Malleable Iron

Descriptive details on Belmalloy, a pearlitic malleable iron produced by the Belle City Malleable Iron Co., are presented in a folder issued recently by this company in which pearlitic malleable irons are discussed.

As explained in the folder, the new pearlitic malleable irons constitute a distinct class of ferrous castings devised to fit into the field between regular malleable and steel. They have physical properties approaching those of medium carbon steel castings at a cost between malleable and steel castings.

Classification of pearlitic malleables is made according to the method employed to produce the final structure: 1. Heat treatment may be interrupted before graphitization is complete; 2. Castings may be completely graphitized and then given a second heat treatment to produce the desired structure; and 3. alloys may be added and the annealing process or heat treatment so regulated that most of the carbon is retained in combined form with a pearlitic structure.

The microstructure of Belmalloy shows a laminar pearlite matrix similar to that of higher carbon cast steel, interspersed with nodules of temper carbon. It is melted in an electric furnace.

For heat treatment, the Belmalloy process employs a Dressler tunnel kiln. It is a 350 feet long muffle type, continuous annealing furnace.

Essential specifications of Belmalloy include: tensile strength, 70,000 to 80,000 lb. per sq. in.; yield point, 45,000 to 50,000 lb. per sq. in.; shear strength, 60,000 lb. per sq. in.; elongation 5 to 10 per cent; Brinell hardness, 179 to 207; and modulus of elasticity in tension, 28,000,000 lb. per sq. in.

Copies of the bulletin mentioned above which describes Belmalloy and lists physical properties of the material may be obtained by addressing the editorial department, AUTOMOTIVE INDUSTRIES, Chestnut and 56th Sts., Philadelphia.

Combine Sheet Aluminum With Veneer

According to the *Aluminum News-Letter* a combination of sheet aluminum and wood veneer has been put on the market for wall covering, paneling, and similar uses. The new product is known as Esswood.

Just Among Ourselves

Timed for Tomorrow

IT is traditional for important sessions of the annual meeting of the Society of Automotive Engineers to be held in the Crystal Room of the Book-Cadillac Hotel. At this year's meeting held during the week just past many of the sessions assumed a crystal-gazing aspect. In some cases this took the form of direct predictions, in others the nature of the subject foreshadowed future developments of institutional interest to the industry as a whole.

Of a direct nature we give you the statement by J. E. Hale of Firestone that rayon cord construction of tires will probably find a wide extension as the price of the rayon material can be reduced. At a student session, Roy H. Faulkner took a look at the "Automobile Engineer's Future" and E. L. Foss of G. M. Research presented some "Previews of Progress."

Legislative problems, always a fecund subject for prognostication, were aired in two papers which reflect current interests related to the possibility of future regulation. "The Outlook Toward Legal Performance Requirements" as presented by Prof. J. T Thompson, highway research specialist of the Bureau of Public Roads, disclosed the nature of some preliminary field studies which will probably affect the future course of other studies on the problem of minimum requirements for truck performance on gradients. Unwillingness of manufacturers or operators to engage in public discussion of Professor Thompson's paper was generally regarded as indicating concern with the subject rather than lack of interest.

Charles A. Harnett, New York's motor vehicle commissioner, took a "Look at the Automobile" which had a lot more significance than a look which John Smith might take at the same subject.

Air conditioning of cars and some recent discoveries affecting cylinder wear were two other session subjects of future importance.

The meeting as a whole was "timed for tomorrow," and gained tremendously in interest from that fact.—H.H.

S.A.E. Annual Meeting

This past week in Detroit, engineers were discussing automotive problems. Here are abstracts of some of the ideas presented. Others will appear in subsequent issues. A general story of the meeting appears on page 63.

Spark Plug Endurance Tests

SPARK-PLUG endurance limitations are said to be one of the factors that are retarding the development of aircraft engines of high output, and to meet this situation Scintilla Magneto Co., Inc., has developed a special plug for this service known as the Bendix 5AFL, which is illustrated in Fig. 1. A paper dealing with the design of this plug and with research work carried on in the course of its development, was prepared by T. Tognola, research engineer, and A. W. DeChard, field engineer.

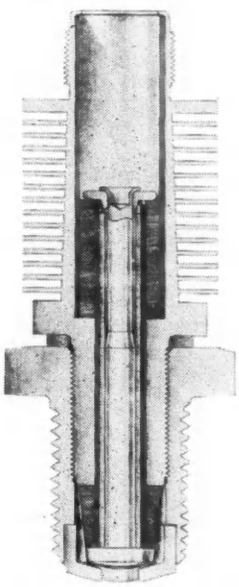


Fig. 1 — Bendix 5AFL spark plug for aircraft engines

The ground electrode (Fig. 2) is of the adjustable, four-prong baffle type, the prongs being relatively wide and flat, and extending over the blunt nose of the core, the sparks passing between the inner surfaces of the prongs and the flat surface of the core electrode. Openings in the ground electrode are just wide enough to permit of adjusting the prongs and inserting a feeler gage for checking, and the baffle action is intended to prevent the rapid accumulation of lead and other foreign matter on the nose of the core. In addition, the design offers the maximum sparking area within the limits of present-day spark-plug standards. The center electrode is of one-piece design, cold-worked. A large copper tube, which surrounds the spindle of the central electrode and rests on the inner surface of the electrode nose, helps to dissipate heat from the nose.

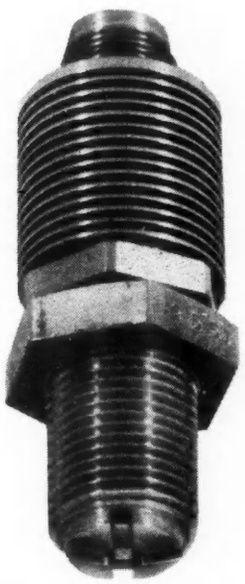


Fig. 2—Ground electrode or shell baffle of Bendix spark plug

Special testing equipment was devised to determine the erosion resistances of various materials that appeared suitable for spark-plug electrodes. Sparks are produced at a rapid rate in a closed chamber maintained at high pressure and high-temperature, and in which there is an atmosphere containing the vapors of doped gasoline and the products of combustion thereof. The erosion resistance is expressed in terms of electrode wear per unit of time. Fig. 3 herewith shows results obtained from four different materials. Curve A is from a material which was recommended for spark-plug electrodes, but which the tests showed to be unsuitable. Curve B is of the ma-

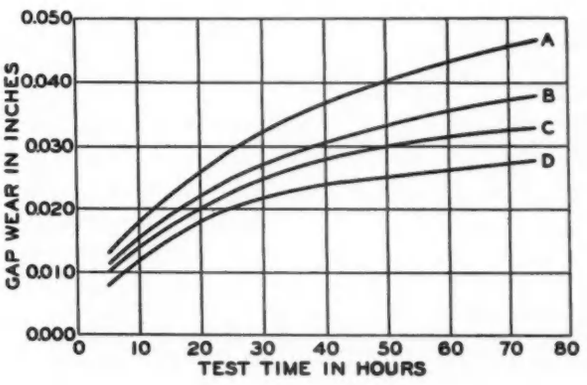


Fig. 3 — Rate of electrode wear with different materials

terial used for the core nose of present standard-production Bendix spark-plugs. Curve C, which shows less erosion than either A or B, is of pure nickel, while the best of all, curve D, presents a laboratory material that is not yet ready for commercial use. The authors stated that a complete set of plugs using electrode material B for the core nose was tested in an actual engine of high output rating for a period of 500 hours without failure of a single plug, and the core noses were not dressed during this period. In the course of the test, the shell baffles, which are of a different material, had eroded approximately 0.032 in.

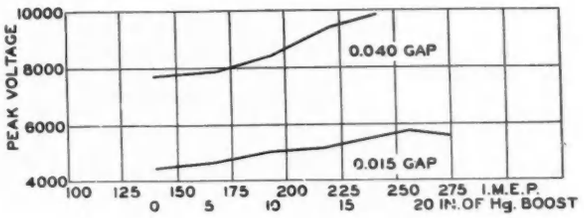


Fig. 6 — Relation between breakdown voltage and i.m.e.p. in actual engine

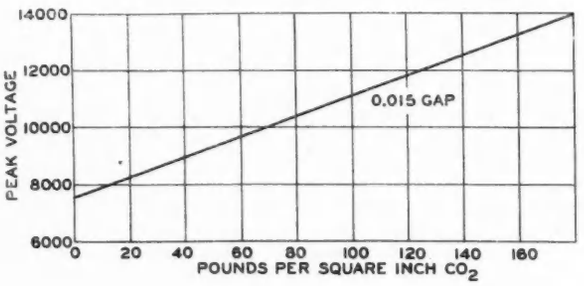


Fig. 5 — Relation between breakdown voltage and gaseous pressure in test bomb

The shell baffle or ground electrode cannot be made of the material used for the core electrode, as this material must be ground to size, and this is impractical in the case of the shell baffle, on which considerable work must be done. The material actually used for the shell baffle is somewhat similar to that of the core electrode in its properties, but lends itself to production on a commercial basis and permits of ready adjustment of the gap. Refinements in the processing of this material give promise of increased life of the ground electrode.

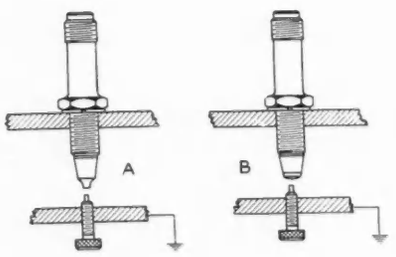


Fig. 4 — Plugs with different electrode patterns

It is known that the voltage required to break down an air gap of a definite length depends upon the pattern of the electrodes, and in the development of the Bendix plug, tests were made with different electrode patterns, the experimental apparatus including a Dumont oscillograph which indicated or recorded to break-down voltage. It was found that, using a Scintilla nine-cylinder aircraft magneto running at 1800 r.p.m., the breakdown voltage of spark plug A, Fig. 4, with a 1/32-in. air gap, was 6180 volts, while that of plug B, with the same air gap, was 9560 volts. With a 3/32-in. air gap plug A required 7060 volts, while plug B required 9570 volts. With a 5/32-in. air gap plug A required 7950 volts and plug B, 9860 volts. For both plugs the breakdown voltage increased substantially in a straight-line relation with the length of air gap. Fig. 5 shows the relation between the breakdown voltage of Bendix production plugs with 0.015-in. air gap in relation to the gaseous pressure (CO_2) at the spark gap. It was found that in actual service in engines the peak voltages are materially lower than with the experimental equipment. Fig. 6 shows the breakdown voltages measured on Bendix plugs in a single-cylinder engine of the liquid-cooled type with a constant speed of 3100 r.p.m., 30 deg. spark advance, carburetor-inlet temperature of 200 deg. Fahr. and a fuel consumption of 0.45 lb. per hp-hr. Tests were made with gaps of 0.015 and 0.040 in. lengths, and the break-down voltages are plotted against i.m.e.p.

Tests made on spark plugs having cooling fins integral with the spark-plug core led to the conclusion that these fins have some merit.

Supercharging Effects on Diesel Design

EFFECTS of supercharging on (Diesel) engine-design features and on engine performance were discussed in a paper by Russell Pyles of Clark Bros. Co. In investigating the effects of supercharging on the stresses in various engine parts, the author compared a normal Diesel engine of 77 lb. per sq. in. b.m.e.p., 100 lb. per sq. in. m.e.p., 425 lb. per sq. in. compression pressure and 750 lb. per sq. in. maximum cylinder pressure, with an engine supercharged to 10 in. of mercury column and having a b.m.e.p. of 115 lb. per sq. in., a m.e.p. of 150 lb. per sq. in, a compression pressure of 550 lb per sq. in. and a maximum cylinder pressure of 850 lb. per sq. in. It is evident that the compression ratio is lower for the supercharge engine, as otherwise its compression pressure would be much higher that that of the standard engine. If a limit is set on the maximum cylinder pressure (to limit stresses on engine parts) then the highest thermal efficiency is obtained with the lowest practicable compression pressure, as this permits burning the maximum proportion of the fuel charge near top center and approaches the constant-volume cycle. The lower limit of practicable compression pressures is determined by starting difficulties, for the compression pressure decreases with speed, in a supercharged engine even more than in a standard one, and a certain compressure pressure is necessary to effect ignition.

To obtain the full advantage from supercharging, the combustion chamber must be fully scavenged by providing sufficient blower pressure and causing inlet and exhaust periods to overlap. The required valve overlap will increase with the engine speed

and can be expressed in square inch-seconds/cu. ft. per second of piston displacement. While it is easy enough to scavenge an open-type combustion chamber, the pre-chamber types introduce some difficulty and may call for the use of auxiliary valves. Fig. 1 shows how the valve-overlap period affects the specific fuel consumption and the ability to carry high loads (with an open-type combustion chamber).

In applications where it is desirable that the engine should be able to develop high torque throughout its speed range, the Roots blower type is preferable to the centrifugal type of supercharger, as with the former the pressure and delivery characteristics do not fall off with speed as rapidly as with the latter. Such applications include those to railcars, switching locomotives, and motor trucks.

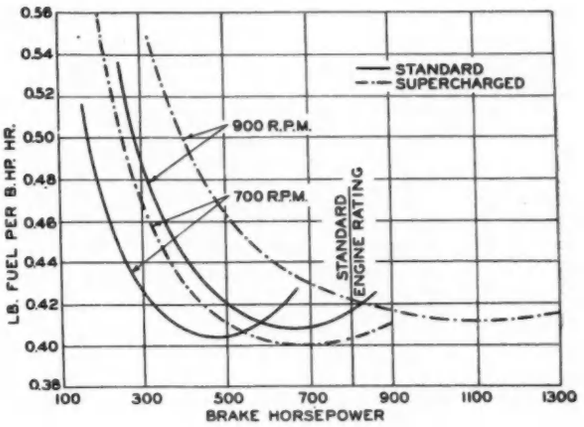


Fig. 2—Effect of supercharging on specific fuel consumption Westinghouse 12-cylinder 9 by 12-in. engine. Supercharge pressure, 10 in. of mercury at 900 r.p.m.

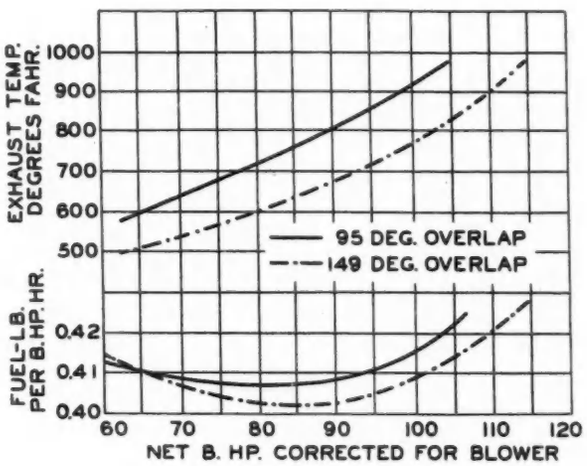


Fig. 1—Effect of valve overlap on fuel consumption and exhaust temperature Westinghouse single-cylinder 9 by 12-in. engine, 9 in. of mercury supercharge pressure, 70 deg. F. air-inlet temperature.

The location of the blower drive is extremely important, because of the effect the blower may have on the natural frequency of torsional vibration of the crankshaft assembly, and also because of the possible effect of torsional vibration on the blower driving gears. When the blower drive is located near the nose of the crankshaft assembly, its effect on the natural frequency of the system is small, whereas if it is at the free end of the crankshaft, the frequency of the system may be materially reduced.

Effective muffling of the blower inlet is necessary, and in addition to providing the inlet with a suitable silencer, it is advisable to use a generous radius at the inlet ports.

Bearing load diagrams were drawn for both a low-speed and a high-speed Diesel engine, both operating with atmospheric induction and a 50 per cent supercharge, and the following conclusions were drawn therefrom: The greatest change brought about by supercharging is in the maximum load on the connecting-rod bearing, and if this should be excessive, the possible remedies are an increase in the reciprocating weight, an increase in engine speed, and a change in bearing material. The increase in the load on the center main bearing is negligible, or if not, it can be compensated for by an increase in the rate of oil circulation. In the supercharged engine the mean bearing load per brake horse power output is less than in the standard engine. In tests reported by John Dickson in an A.S.M.E. paper it was shown that the heat loss to the lubricating oil increased only 5 per cent when the b.m.e.p. was increased 50 per cent by supercharging.

With the increase in the maximum cylinder pressure due to supercharging, the energy input to the crankshaft due to the sixth-order critical will be greater, and if a supercharger is installed it may be necessary to increase the crankshaft diameter or provide increasing damping. Piston temperatures naturally will be somewhat higher in the supercharged engine. Tests on an engine operated both without and with supercharger, in which the output was increased 50 per cent by supercharging indicated that the temperature at the edge of the piston crown was 40 deg., and on the skirt 25 deg. Fahr. higher than without supercharging. The effect of supercharging on the specific fuel consumption is shown in Fig. 2. It will be seen that there is very little difference between the minimum specific fuel consumptions with and without supercharging.

In concluding his paper the author expressed the views that the simplicity of supercharging and the resulting reduction in engine weight promised wide future applications, and that it was economically sound to include supercharging in the origing engine design, as it reduces the cost per horse power.

More About Supercharging Diesels

A NUMBER of interesting facts in connection with the supercharging of Diesel engines were brought out in a paper by Harte Cook, American Locomotive Co. If an engine is supercharged so that a gage on the inlet manifold registers 5 lb. gage pressure, it might be expected that the cylinder would receive one-third more air per cycle than with normal induction. Actually it will receive some 50 per cent more air, and 50 per cent more fuel can be burned, because when a supercharger is used a greater overlap of inlet and exhaust periods is provided for, so that the cylinder is scavenged better, and the temperature of the charge at the end of the inlet stroke is materially lower. While the pressure in the cylinder at the end of the compression stroke

will be increased substantially in proportion to the manifold pressure, the maximum combustion pressure will not be increased nearly as much, because the ignition lag is reduced by the higher compression. Mr. Cooke said he had found that with practically the normal compression ratio and a supercharge of 5 lb. per sq. in., there was practically no increase in the maximum combustion pressure.

The author discussed the various types of supercharger, including the reciprocating piston type, the Roots-blower type, the centrifugal type and the turbo-blower type. He reached the conclusion that for large four-cycle engines supercharging seems very desirable from an economic standpoint. That supercharging has not been used extensively in the past is due to the fact that the necessary equipment has been so expensive that it seemed better to obtain the extra power by the use of larger or more cylinders.

From experience had so far it seems that supercharging has a beneficial effect on the engine, the exhaust valve requiring less attention and the wear of the engine being reduced. Not very much experience with superchargers has been gained as yet, and further improvements in these devices are to be expected.

With turbo superchargers the impeller blades sometimes become coated with a deposit that seems to be caused by a small amount of oil in the air sticking to the impelled and catching the dust as it passes through. The deposit may reduce the size of the air passages to one half, so that the supercharge may be cut in half. This trouble can be remedied by running the blower with an open delivery and feeding Oakite plater's cleaner in with the air for a few minutes, which will remove the coating. High-speed turbo-type fans occasionally have given rise to bearing trouble, but this problem is gradually being solved.

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Trial at Milwaukee

(Continued from page 76)

of himself and his colleagues, was to get some one to dissuade the jury from voting indictments. He insisted the purpose was proper, but charged that the Government breached the proprieties in using a grand jury to obtain information for what should have been a proceeding in equity. He said Mr. Jackson told them the jury was "exercised over the reserves question," and Dills said that also he considered an impropriety.

Judge Geiger questioned Mr. Hardy closely as to his acts and intent when he returned from the Washington conference of Nov. 22, two days before the jury instructed Mr. Hardy to draw up indictments, as he revealed after the court issued the order summarily discharging the jury, deeming himself released from secrecy.

Mr. Hardy said he "thought" he had left the decree in Washington, and flatly declined to say what he did in the jury session. In his prepared statement to the court he said he had warned the automobile attorneys that the jury would proceed to do its duty.

He added: "The manufacturers coerced dealers into trading with the favored finance firms, and in 1925 began the practice euphemistically called 'reserves.' Actually it is an excess finance charge which is split with the dealer. Since that date the public has paid $300,000,000 in such charges. Last year alone they paid $60,000,000."

When Mr. Hardy did not produce the decree and declined to say what he did in the jury session, Judge Geiger asked: "That leaves your intent open to inference, does it not?"

Mr. Hardy replied: "I am greatly embarrassed by the restriction placed upon me."

A moment later Judge Geiger freed him from such embarrassment by ordering the jury discharged in the following words:

"It is my judgment that the Department of Justice did not have power to negotiate for a consent decree. There are limits to what can be done with subject matter pending before a grand jury. It was improper for these parties to get together and talk of a 'deal' on such a subject. The court has no recourse but to discharge the jury, and the clerk will enter an order to that effect."

Mr. Hardy was instantly on his feet, shouting to be heard above the uproar which ensued upon the judge's statement. He said he was now free to disclose that the jury's adjournment on Nov. 22 for three weeks was not to permit resumption of the negotiations in Washington, but to permit him to draft indictments which had been voted. The disclosure did not alter the court's decision. Judge Geiger curtly denied Mr. Hardy's motion to vacate his order on the ground that indictments had been voted. Effect of the order of discharge is to nullify all proceedings and indictments of the jury on the subject of automobile financing. Mr. Hardy finally obtained leave to file an exception to the court's order, thus protecting the Government's position pending decision on its next move.

CHILTON ROUNDTABLE

(Continued from page 78)

From Motor World Wholesale

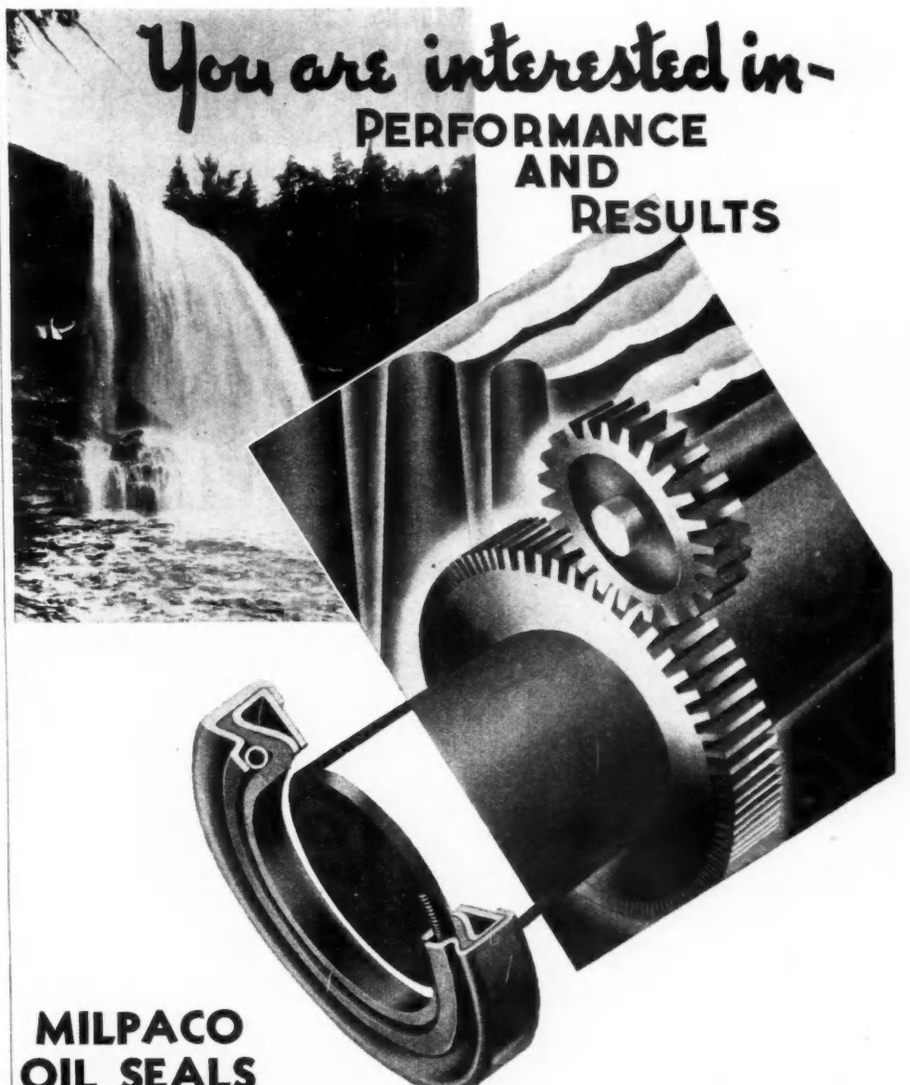
"Automobile expenditures have risen to second place as sharers of the average farm 'family living' dollar according to the U. S. Department of Agriculture's annual report forecasting rural expenditures for 1938. . . . *Because of this increased importance of the automobile the department suggests that sellers must change their thinking about farm spending—that marketing index figures based primarily on expenditures for food and clothing no longer indicate the trends in the cost of living of farm families."*

From Automobile Trade Journal

"Faced with the alternative of either drastically reducing expenses or increasing service charges to their customers in order to stay in business, the Anderson-Buick Company of Seattle chose the middle course and instituted a Pay-as-You-Go Plan which has solved its problem. . . . Savings in operating expenses and in the elimination of uncollectable accounts resulting from the plan have enabled the company to equip its service department with modern time-saving tools, and to slightly lower its service charges."

GM Signs For New York Fair

General Motors Corp. has taken six and seven-eighths acres of space at the New York World's Fair. It is the largest space yet taken costing more than $56,000.



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Die Casting Sets New Pace in the 1938 Models

(Continued from page 85)

latter being added at the request of a large purchaser. Wear on the bushing (through which the piston rod slides) is reported somewhat less than that in the unbushed hole, but wear on the rod is somewhat greater. Naturally, the cost of the bushing itself and of placing it in the casting die between each shot increases the cost of the part over that without a bushing, but production in either form is quite simple.

Among the newer die castings are the control lever employed under the steering wheel for operation of the Olds and Buick semi-automatic gearset, and the housing for the inner end of this lever. The lever itself has a tubular end and a C-shaped section through most of the remaining length, the handle end being serrated or knurled to receive a plastic knob. This is a fairly simple die casting.

MISCELLANEOUS APPLICATIONS: On nearly every car there are some die castings to which no reference has been made above, some being classed as body parts and some as chassis elements. Some, as in the case of the stanchion for ventilating wings employed on convertible models, are of a shape so irregular, and require so many variations in section thickness, that only a cast part can be considered. Although sand castings might be employed, the cost of grinding a large part of the surface prior to plating would be prohibitive, and it would be difficult to core holes accurately and to hold other dimensions within the desired limits. In some cases, it would be impossible to sand cast in the thin sections desired. Here again, the die casting is the only logical solution, for its surfaces are smooth, dimensions accurate, and such machining as is needed is usually confined to the simplest and most rapid operations, nearly all holes being either cored or spotted in required locations. In some General Motors applications, a wing frame of this style is extended into the door and made to house a part of the regulating mechanism. Here again, the utility and diversity possible in a single die casting are well exemplified.

Housings for front fender lamps and tail and license lamps constitute another classification of parts approaching the ideal for die casting. Light sections, varied in thickness as required, smooth contours, accurately cored recesses, bosses of any curvature for convenient attachment to body parts, and smooth external surfaces are all attained in the die casting. If, as in the Buick license lamp, it is desired to include a recess for a handle for a rear compartment door, this is readily accomplished.

Cadillac this year has introduced what may become a new vogue in providing die cast end covers for running boards. Desired contours and fastening means are readily secured, and other advantages of die castings are realized.

Similar examples of the utility of the die casting might be multiplied almost indefinitely. While there are, as with all metals, limitations to their use, there is no doubt that each year will bring forth new applications.

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Back in the gay 90's when dad courted mother on a bicycle built for two, Morse Brothers developed a new type of bicycle chain — a block chain with rocker joint.

This was the forerunner of the present Morse Silent Timing Chain, now used on 70% of all chain-front-end cars built. Morse Timing Chains, with sprockets to match, provide the quietest, most dependable form of front end drive.

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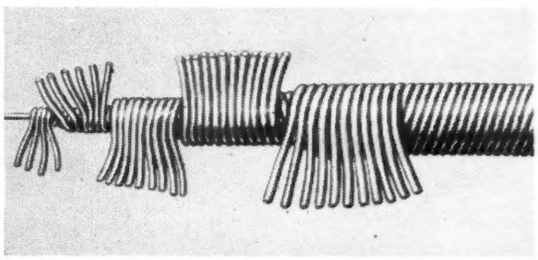
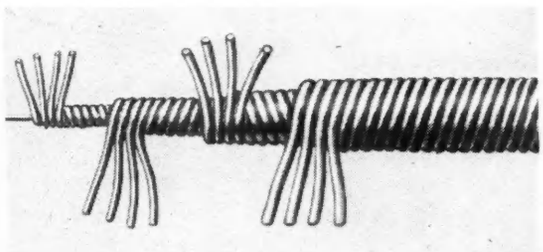
MEMO for Designing Engineers

There is a basic difference between remote control and power drive flexible shafts



.150" Diameter S. S. White Remote Control Flexible Shaft. 5 Layers, Total Wires, 43.



.150" Diameter S. S. White Power Drive Flexible Shaft. 4 Layers. Total Wires, 17.

Although they look very much alike there is a *big* difference in the *construction* of these two classes of S. S. WHITE shafts, and also in their *physical characteristics.*

CONSTRUCTION

Remote Control shafts of a given size are made up of more layers of wire, more wires per layer, and wires of smaller diameter, than Power Drive shafts of the same size. Note the example illustrated.

PHYSICAL CHARACTERISTICS

Remote Control shafts are featured by three characteristics: *minimum torsional deflection;* approximately *equal deflection for either direction of rotation; low internal friction.* All three characteristics, properly balanced, are essential in a shaft for remote control use.

Power Drive shafts have *high torsional strength* combined with *adequate flexibility* to suit them for their particular field of application.

AVAILABLE IN A WIDE RANGE

S. S. WHITE Power Drive and Remote Control shafts are regularly made in a large range of sizes, and a range of physical characteristics in each class that covers a wide diversity of application possibilities.

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If you have a remote control or power drive problem, a flexible shaft may well be the answer. Our engineers will be glad to help you work it out . . . no obligation . . . just send us the details.

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From time to time we publish bulletins giving information about flexible shafts and about actual applications. If you would like to receive this material, write and ask us to put your name on our mailing list.

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